THESIS

FOR THE AWARD OF DEGREE OF

MASTER OF SURGERY

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"THE STUDY OF FUNDUS CHANGES IN HYPERTENSIVE DISORDERS OF PREGNANCY"

By

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LIST OF ABBREVIATIONS

- ACOG- American college of obstetrician and gynaecologists
- BP- Blood pressure
- BOV- blurring of vision
- DBP- Diastolic blood pressure
- GA- gestational age
- HELLP- Hemolytic anaemia, elevated liver enzymes, low platelet.
- Hrs- hours
- Mg/day- milligram per day
- Ml/day- millilitre per day
- Mm Hg- milimeter of mercury
- POG- period of gestation
- PGI2- prostaglandin I2
- PIH- pregnancy induced hypertension
- RFT- renal function test
- SBP- systolic blood preesure
- Sr- serum
- TXA1- Thromboxan A1
- VEGF- vascular endothelial growth factor
- Wk- week
- Yrs- years

INTRODUCTION

INTRODUCTION

Hypertensive disorders of pregnancy are one of the main causes of maternal and neonatal mortality and a stigma in the field of obstetrics. A number of physiological and pathological changes are related to pregnancy. It is defined as having high blood pressure of >140/90 mm Hg taken twice with at least 6 hourly period during pregnancy that appears after 20 weeks of pregnancy and has no other known cause of high blood pressure (B.P.). 5–10% of all pregnancies are complicated by hypertensive problems. [1]

Pregnancy is the unique physiological condition in which the majority of physiological markers are aberrant. Pregnancy causes significant morphological, physiological, and biochemical changes in a woman. Patients with high blood pressure had significantly higher maternal and foetal mortality and morbidity compared to normotensive gravidas.

Toxemia in pregnancy has been known to cause fatalities and difficulties for more than 2000 years. [2] Currently, the most often used terminology for the following syndrome is "hypertensive disorders of pregnancy" by the American College of gynecology and obstetrics.[3] It is a significant factor in mortality and morbidity in mothers and foetuses.

Hypertensive Disorders of Pregnancy (HDP) earlier known as Pregnancy induced hypertension (PIH) have been classified as Gestational hypertension, preeclampsia, severe preeclampsia, and eclampsia. After 20 weeks of pregnancy, PIH develops as a hypertensive condition when there are no other known reasons of high blood pressure (BP) (BP >140/90 mmHg measured twice with at least a 4-hour gap), along with widespread edema and/or proteinuria (>300 mg per 24 hours).[4]

When blood pressure reaches 140/90 mm Hg or higher for the first time after mid-pregnancy, gestational hypertension is identified.

Preeclampsia is the term for gestational hypertension that is linked to substantial proteinuria (>300 mg/24 hours).

Eclampsia is the medical word for preeclampsia that is exacerbated by a generalised tonic-clonic convulsion.

Preeclampsia is the term used when PIH is accompanied by substantial proteinuria (protein in urine > 0.3g/in 24 h).

Preeclampsia is split into two categories based on its severity: mild preeclampsia and severe preeclampsia. The most important primary indicator is hypertension. Oedema begins in the lower legs and can escalate to anasarca or severe oedema.

Preeclampsia is classified as eclampsia when it is accompanied by seizures. In hospital settings, the overall incidence of PIH ranges significantly (5-15%).

The Preeclampsia/Eclampsia syndrome is a multi-systemic condition that can cause hepatic, renal, and hematologic problems, as well as neurologic and cerebral symptoms.BP>140/90 mmHg, proteinuria+, and/or modest leg edema are signs of mild preeclampsia. BP >160/110 mmHg, proteinuria++ or ++++, headache, epigastric pain, abnormal liver function tests, and a rise in serum creatinine are all symptoms of severe preeclampsia. [3,5,6] Using the dipstick method, proteinuria was measured as +=0.3 gm/L, ++=1 gm/L, and +++=3 gm/L.

The cause of HDP is still unknown. Theories include endothelial dysfunction, increased free radical damage, immune system processes, genetic susceptibility, and nutritional inadequacies (generalized vasospasm and capillary leak). The primary factor affecting the visual system is severe toxaemia. The majority of the time, but not always, systemic hypertension correlates with retinal vascular abnormalities. The development of the vascular constriction may take days, and it may last for weeks or months.The vascular endothelial dysfunction and its effects (generalised vasospasm and capillary leak) appear to be connected to the pathological alterations of this disease.

The retina is a special site where the human body's vasculature may be seen clearly with the use of an ophthalmoscope. The eye can be used as a window to observe the body's blood vessels. Therefore, a change in the retinal arterioles may signify a similar status of the placenta; as a result, it provides a reasonable indication of the health of the placenta and the foetus.[7]

If PIH is found early, complications for both the mother and the foetus can be averted.

Richard et al. in 1994 concluded that vasospastic symptoms are reversible, and after delivery, the retinal vessels quickly recover to normal. The condition frequently affects the choroid, which may experience ischemia and infarction. If there isn't a major infarction, occipital lobe and optic nerve ischemia may happen, although recovery normally happens.

In HDP, Visual disturbances are a very uncommon presenting sign. Amaurosis, photopsia, scotomata, diplopia, chromatopsia, and hemianopia are additional, less frequent symptoms. The conjunctiva, choroid, optic nerve, and visual cortex can all be impacted, although abnormalities of the retina and retinal vasculature are the most common. Vascular involvement frequently results in visual loss. Central retinal artery occlusion, secondary optic atrophy, macular tears, central serous retinopathy, retinal detachment, central retinal vein occlusion, choroidal ischemia, and hemorrhage are all disorders that can result in vision loss.

In HELLP syndrome instances, there may be spontaneous vitreous bleeding. Most retinal abnormalities go undiagnosed most of the time. Seizures may be preceded by visual symptoms. Due to comparable vascular ischemia alterations in the placenta, the evolution of retinal abnormalities is correlated with the progression of HDP as well as with foetal mortality. [8]

The choroids, the optic nerve head, and the vascular of the retina are all affected by hypertension. Vascular constriction is the major pathophysiologic reaction of the retinal vasculature to systemic arterial hypertension. The result of this reaction to elevated blood pressure is localised or widespread vasoconstriction. Additionally, elevated vascular permeability leads to extravasation of fluid into extravascular areas.Reduced retinal artery to vein ratio, cotton wool spots, haemorrhages, Elschnig spots, and serous retinal detachments are a few examples of the retinal alterations that may result.[9] Reduced arteriole to vein ratio and preeclampsia were found to be significantly correlated by Jaffe and Schatz, raising the possibility that retinal vasospasm and blood flow resistance may be the cause of the visual complaints.

Vasospastic symptoms can be reversed, and the retinal vessels expand quickly.The spasm and narrowing of retinal vessels is the most frequent anomaly in HDP.

Hypertension in pregnancy is the major concern of public health issue worldwide. Ophthalmoscopy not only aids in the diagnosis of the condition but also in determining its severity, progression, response to treatment, if any, and final result or prognosis.

It is important for medical professionals to be aware that the acute development of visual symptoms in pregnant women can be the first sign of (pre) eclampsia. These professionals include emergency department doctors, obstetricians, family doctors, neurologists, and ophthalmologists. Obstetricians should recognise the importance of these alterations and explore the best diagnostic alternatives with the ophthalmologist because visual abnormalities are a diagnostic criterion for severe preeclampsia.

The purpose of this study is to diagnose any fundus changes in the pregnant females with hypertensive disorders as early as possible so that appropriate action can be taken in the patient On time for good prognosis of the mother as well as the fetus .[10]

AIM AND OBJECTIVES

AIM:

To study fundus changes in Hypertensive Disorders of Pregnancy.

OBJECTIVES:

1. To study retinal manifestations in HDP.
2. To determine the importance of fundus examination in HDP patients to assess the progression of the disease and further management.
3. To study the association of retinal changes with blood pressure, proteinuria and severity of HDP.
4. To see the prevalence of fundus changes on the basis of Age, Trimester, severity of HDP and gravida.

REVIEW OF LITERATURE

Review of literature

Numerous studies have been done to identify ocular alterations during pregnancy. Retinal changes linked to hypertension have been observed since the early 19th century. 5–10% of pregnancies are complicated by hypertensive diseases, which are also the main cause of maternal death, particularly in underdeveloped nations.

Eclampsia is a severe and potentially fatal pregnancy condition that manifests as tonic-clonic seizures, mainly in patients who already have pre-eclampsia.

German ophthalmologist Albrecht Von Graefe revealed serous retinal detachment in a patient with pregnancy-related toxemia in his first report on retinal alterations associated with preeclampsia in the literature. By reporting on 680 patients with toxemia of pregnancy, Schiotz published the first extensive study of toxemia in pregnancy in ophthalmology in 1921. 35 of these individuals exhibited fundoscopic abnormalities, and three of them experienced retinal detachment. [11]

With a mean age of 29.06 years, **Uma MS, Bhuvana Set al.in 2022** [12]came to the conclusion that 23.53% of PIH patients had hypertensive retinopathy. Grade 1 hypertensive retinopathy was the most common symptom in PIH patients (51.16%). A statistically significant 72% of eclampsia cases and 12% of pre-eclampsia cases experienced vision loss . Refractive error affected 41% of the patients, and papilledema affected 6% of the patients.

KHATEEB et al.[13] in 2022 assessed 100 patients in total . out of which 33 (33%) multigravidas, 45 (45%) primigravidas, and 22 (22%) grand multiparas were present. Three percent had eclampsia, while 56 percent had severe preeclampsia and 41 percent had mild preeclampsia. In 58 (58%) of the patients, retinal abnormalities (hypertensive retinopathy) were found. Blood pressure , proteinuria , and the severity of hypertensive diseases all showed statistically significant positive correlations with the occurrence of retinal alterations.[14]

Gaikwad, C. et al in 2022[15] studied that in cases of grade I hypertension, the prevalence of aberrant fundus findings was 10.1%, whereas in cases of grade II and III hypertension, it was 100%. Significant correlations between the degree of hypertension and aberrant fundus findings were found in cases of hypertension during pregnancy. In cases with grade 1+ proteinuria, the prevalence of aberrant fundus findings was 85.7%, compared to 0% in cases with no proteinuria. Atypical fundus features were present in all patients of proteinuria of grade 2 or higher. Proteinuria severity was shown to be significantly correlated with aberrant fundus findings.

Chandran, J.R., Narayanan et al.in 2021 [16]observed that 22% of patients with severe preeclampsia and 100% of individuals with eclampsia experienced ocular symptoms. The most prevalent ocular complaint was blurry vision. 48.7% of the research participants experienced fundus alterations. The most frequent finding on fundus examination was artery narrowing. Serum creatinine and systolic blood pressure were discovered to be indicators of fundus alterations . Fundus involvement was found to be strongly linked with the incidence of foetal growth limitation.

Sharma J.C et al.[17]in 2020 observed that 68% of patients showed retinal abnormalities, with grade 1 being the most prevalent. With increasing grade of fundal alteration, there was a significant increase in the mean systolic and diastolic blood pressure. The Patients with mild forms of preeclampsia (i.e., 65.5% of patients) lacked retinopathy. None of these patients experienced alterations of grade 3 or 4. 88.9% of women with preeclampsia who had severe symptoms had retinopathy in varied degrees.

Chandran et al. in 2021 [18]noticed that out of 150 patients, 22% of those with severe preeclampsia and 100% of those with eclampsia experienced 0cular symptoms. The most prevalent ocular complaint was blurry vision. 48.7% of the research participants experienced fundus alterations. The most frequent finding on fundus examination was artery narrowing.

Serum creatinine and systolic blood pressure were discovered to be indicators of fundus alterations . It was discovered that fundus involvement was highly correlated with the prevalence of foetalgrowth limitation.

Khanom, R. et al.in 2020 [19] in this study the most frequent retinal change in 100 patients with PIH was constriction of the arterioles (83%). Patients with severe hypertension, exudate (12%), and haemorrhages (10%) had significantly more retinal abnormalities. Macular edoema (5%) and retinal detachment (2%) are warning signals that the pregnancy should be terminated to protect the mother's vision.

According to a study by **Dr. ShivanginiKumariShekhawat et al. (2019–20),** the incidence of PIH is 15.2% nationwide in India; however it is four times greater in primipara women than in multipara. The prevalence of ocular involvement in PIH ranges from 30 to 100% in various studies. 66% of the cases in the research had normal fundus changes, 29% had grade I abnormalities, and 5% had grade II changes. Changes in grades III and IV were not seen.[20]

Aijaz, S. et al.[21] in 2019 studied that fifty-five (28.06%) patients out of 196 instances exhibited grade 1 alterations. Grade 4 modifications were only noticed in 1.53% of instances, while Grade 2 and Grade 3 changes were identified in 15.31% and 3.57% of cases, respectively. They concluded that grade I alterations were most common (48.47%), followed by grade II changes (15.31%), grade III changes (3.57%), and grade IV changes (1.53%) in pregnancy-induced hypertension and pre-eclampsia.

In a study **Shekhawat et al.**[22]noticed that by grade I in 29% of cases and grade II in 5% of cases, normal fundus alterations were observed in 66% of cases. Changes in grades III and IV were not seen. We can take the existence of retinal alterations as an indirect indicator of the severity of PIH and of prognostic significance.

Nellore et al. [23]observed that seventy people were assessed in all. The patient's average age was 24.12 years (15-40). 37 of the patients (53.29%) had retinal changes. 33 patients (47.14%) had Grade I, and 4 patients (6.15%) had Grade II. None of the participants that were admitted had any haemorrhages, hard exudates, or retinal detachments.

Kour M. et al. in 2019 [24]observed that 90 patients with PIH in total were investigated. 32 patients (35.55%) and 58 cases (64.42%) were multigravidae and primigravidae, respectively. The presence of fundus in 28 patients (31.11%) was noted. Grade I modifications were present in 20 patients (22.22%), grade II changes were present in 6 patients (6.66%), and grade III changes were present in 2 patients (2.22%). The severity of the disease and blood pressure levels are correlated with the degree of retinopathy.

In a 2018 study by **JAYASHREE MP et al.**[25]out of 150 patients, 32 patients (21.1%) exhibited arteriolar attenuation, the most frequent retinal result, which included generalized arteriolar attenuation in 12 patients (37.5%), and focal arteriolar attenuation in 20 individuals (62.5%). One patient had retinal detachment. Retinal alterations had a statistically significant positive correlation with blood pressure and the severity of PIH.

Tharihalli, C et al.[26]in 2017 concluded in a study of 432 individuals, that 31.3% had Grade I hypertension alterations and 41.7% showed retinal abnormalities on fundoscopy. 4.2%, 2.1%, and 4.2% of the alterations observed were in the grade II, III, and IV range. The severity of preeclampsia worsened along with an increase in blood uric acid levels. The severity of preeclampsia significantly increased the frequency of IUFD (8.3%), stillbirth (8.3%), and need for NICU stay.

According to the findings of a study by **Laura Benschop et al. (2017)**, 3391 women were assessed during pregnancy and 6.2 years after the index pregnancy (90% range 5.7-7.4 years) using data on pre-eclampsia, gestational hypertension, and retinal vascular calibres. Six years after giving birth, pre-eclamptic women's retinal arteriolar calibers were lower than those of normotensive pregnant women. Similar patterns were seen in women who had experienced gestational hypertension in the past. However, they found greater venularcalibres in women who had previously experienced gestational hypertension compared to those who had previously delivered normally. Wider retinal venularcalibres and smaller retinal arteriolar calibres reflect this.[27]

Krishnakumar et al.[28] in 2016 stated that 27 patients (58.69%) had hypertensive retinopathy, with Grade I changes in 24 (52.1%) and Grade II abnormalities in 3 (6.5%). No patient had any exudates, haemorrhages, or retinal detachments. Retinal alterations and blood pressure were statistically significantly positively correlated with preeclampsia severity and blood pressure .

Kapil A Das et al. [29]from Mumbai in 2016 observed in their study of 117 patients with pregnancy-induced found 38.4% of fundus alterations. They compared illness severity with age, parity, and retinal abnormalities and came to the conclusion that there was a statistically significant correlation between parity and PIH severity. [12]

According to a study by **Rahul NavinchandraBakhda et al.[30]** preterm births, intrauterine deaths, stillbirths, and low birth weight babies are more frequent in mothers who have positive fundus modifications, Greater rates of perinatal death were observed in patients with Grade II hypertensive retinopathy (33.85%), Grade III (54.29%), and Grade IVBakhda (100%) retinopathy.

Varija et al.[31] noticed that the patients who were experiencing imminent eclampsia (76.5%) and eclampsia patients (50%), respectively, had higher prevalences of retinal alterations. This association between the severity of PIH and the development of retinopathy changes was found to be statistically significant. As the severity of PIH increased, the odds of women developing

retinopathy also increased significantly, from OR: 17.6; 95% CI: 3.1-136.3 in severe PIH to OR: 253; 95% CI: 47.2-1935 in imminent eclampsia.

Bharathi, N. Rama et al. [32]concluded that 35 cases—or 23.33%—of the 150 PIH diagnoses exhibited fundus abnormalities. One (0.66%), six (3.9%), and 26 (17.33%) of the modifications were Grade I, Grade II, and Grade III, respectively. In 2, or 1.3%, there was a grade IV serous retinal detachment. The degree of retinopathy was associated with the severity of the illness and levels of hypertension.

Shah AP et al.[33]in 2015in their study of 150 patients with PIH, they found that 18 (12%) of the patients had retinal abnormalities (hypertensive retinopathy), with Grade 1 occurring in 12 (8%) and Grade 2 in 6 (4%). No patient had any exudates, haemorrhages, or retinal detachments. There were 76 (or 50.67%) primigravida. 49 (32.67%) patients had preeclampsia, 9 (6%) had eclampsia, and 92 (61.33%) of the patients had gestational hypertension.

In a study by **Mackensen F et al.**[34]found that retinal abnormalities can range in severity from 40% to 100% of pregnant women with high blood pressure have pre- or eclampsia- or eclampsia-related retinal changes. Ocular exams should be performed on diabetic women both before and throughout pregnancy. In 55% of cases, pre-existing retinal abnormalities get worse during pregnancy.

Low birth weight is linked to retinal abnormalities, claims**Javadekar et al.** [35]In a study in 2013 that they conducted on 100 participants, 42% of PIH instances had fundus abnormalities, and 60% of the women were primigravida. All PIH patients should have their eyes examined, as the existence of alterations is considered to be an indirect indicator of the severity of PIH.[11]

Reddy SC et al.[36]had reported that retinal abnormalities (hypertensive retinopathy) were noted in 46 (59%) patients, with grade I changes occurring in 41 (52.6%) and grade II changes occurring in 5 (6.4%) of patients with PIH. These changes were substantially correlated with blood pressure, proteinuria, and disease severity. An examination of the fundus aids in determining the severity of PIH. No patient had any exudates, haemorrhages, or retinal detachments.

Karki P et al. [37] found that low birth weight (2.5 kg) was associated ($p = 0.016$) with anomalies in the retina and optic nerve head. Low Apgar scores have been linked to anomalies in the optic nerve head and choroidal changes.

MATERIALS AND METHODS

MATERIALS

This study was conducted in outpatient department of Santosh Medical College and Hospital, Ghaziabad .

Source of data: Department of Ophthalmology, Santosh Medical College and Hospital, Ghaziabad

Study frame: Ophthalmology OPD (out patientdepartment), Santosh Hospital

Study duration: November 2020- August 2022.

Study design: Cross Sectional, Observational study.

Sample size: 84 cases will be taken as sample size.

Sample size estimation

Based on the previous study conducted by N.RamaBharathi et al. at King George Hospital, Vishakhapatnam whwere significant fundus changes were seen in 53.29% patients of PIH.

$$n = Z2\ P(1-P)/d2$$

Z= 1.96 at 5% level of significance

P= Prevalence of 53.29% (Based on the study conducted by N.RamaBharathi , N. RamyaSeetham and Krishna Mayee at King George Hospital, Vishakhapatnam).

d = Relative error (20% of P)

n = 84

STATISTICAL ANALYSIS

- Data will be collected manually, tabulated in MS windows excel sheet.
- All the data will be represented in the form of number and percentages.
- Graphical representation of the variable will be shown to understand the results clearly and to measure the association for categorical dataset will be analysed using appropriate test.

Inclusion criterias

- Pregnant females fulfilling the criteria of HDP and willing to participate.
- Patients with 28 weeks of gestation and above.

Exclusion criterias

- Patients with pre existing hypertension or chronic hypertension.
- Patients with co existing Diabetes Mellitus.
- Patients with any coexisting hepato -renal diseases.
- Patients with co-existing ocular morbidity like cataract, corneal opactities or Glaucoma.
- Patients with pre existing retinal pathologies
- Patients with hazy media unfavorable for fundal examination

METHODOLOGY

The present study was conducted in the outpatient department of ophthalmology , Santosh Medical College and Hospital ,Ghaziabad, to study the patterrn and prevalence of Fundus changes in Hypertensive Disorders of Pregnancy" in the age group 18-42 years old pregnant in Delhi NCR region .

Tools that were used in the study were :

INFORMED CONSENT :

The patient was provided with a consent form that gave details of all the steps and the purpose of the study. The patients were given explanations in their language about everything.

TORCH LIGHT AND SLIT LAMP DIFFUSE EXAMINATION:

Each patient was subjected to detailed history for any eye symptoms and torch light was used to see ocular alignment and motility, pupillary examination and to exclude gross anterior segment pathology.

DILATATION OF PUPILS:

Both the pupipls were dialted with Tropicamide % by putting 3 drops in both the eyes with a gap of 10 minutes.

FUNDUS EXAMINATION :

The fundus examination was done in dim lights bedside with :

1) Direct Ophthalmoscopy.

2) Indirect Ophthalmoscopy.

FUNDUS PHOTOGRAPHY :

Volk's in view fundus camera was used to take fundus pictures.

OCT :

The spectrum domain OCT is a rapid, easy, and painless way to measure how much serous fluid has accumulated .Moreover helpful for follow-up.

A new technique called multinodal imaging combines confocal scanning laser ophthalmoscope and spectral domain OCT to provide the advantages of retinal angiography and OCT. Infrared reluctance imaging, red free imaging, fluorescein angiography, ICGA, autofluorescence, and OCT imaging are all made possible by multinodal imaging. It gives the benefit of utilising the imaging modalities individually, concurrently, or in various combinations.

FLUOROSCEIN ANGIOGRAPHY:

In preeclamptic individuals with retinal detachment, the majority of fluorescein angiographic studies have highlighted the absence of retinal vascular abnormalities and shown choroidal vascular abnormalities. These findings offered clinical proof that choroidal arteriole and choriocapillary blockage contributed to retinal detachment in pregnancy.

ULTRASONOGRAPHY:

With the help of doppler techniques, AScan (time-amplitude) and B-scan (scanned, intensity modulated) techniques, as well as modern 3-D methods, ultrasound has made it possible to examine the eye and orbit in great detail. A-scan uses quantitative and kinetic research to quickly scan the entire planet. A piece of the eye and orbit can be seen anatomically thanks to B-scan ultrasonographic imaging. Eyes that cannot be seen due to corneal opacities, cataracts, bleeding, etc. can be examined using ultrasound. Contrast-enhanced ultrasonography (CEUS) and 3-D reformatting of ultrasound images are more recent improvements that improve the accuracy of ophthalmology diagnosis. It is quite helpful in distinguishing between vitreous membrane and retinal detachment.

IMAGING MODALITIES:

For the majority of intracranial neuro-ophthalmic reasons, MR is preferable to CT. Pregnancy frequently makes CT contraindicated. At many institutions, the need for catheter angiography has decreased as a result of recent advancements in vascular imaging, such as MRA. Undiagnosed visual loss, amurosisfugax, unilateral or bilateral optic neuropathy, cortical blindness, papillary abnormalities, papilloedema, optic atrophy, and headaches are all indications for an MRI.

Hypertensive retinopathy changes seen as described below in right or left or both eyes, will be taken as positive findings in that patient.

OCULAR CHANGES IN HYPERTENSIVE DIORDERS OF PREGNANCY

In 40% of individuals with the preeclampsia-eclampsia syndrome, visual abnormalities may emerge and, in a few rare cases, may be the first symptom. The most typical symptom is blurred vision; other, less frequent ones areamaurosis, photopsia, scotoma, diplopia, chromatopsia, and homonymous hemianopsia. The visual system may be compromised in 30% to 100% of preeclampsia-eclampsia patients.

Preeclampsia-eclampsia can also damage the choroid, optic nerve, and visual cortex, while abnormalities of the retina and retinal vasculature are most frequently present [7,8].

The most frequent anomaly observed in preeclampsia-eclampsia syndrome patients, retinal vascular alterations occur in 40% to 100% of cases9,10. Severe pre eclampsia-related retinal changes resemble those caused by hypertensive retinopathy without the intrinsic changes of arteriolosclerosis [11].

Spasm and constriction of retinal arteries are the most typical retinal abnormalities. In almost 70% of preeclampsia-eclampsia cases, Wagener documented spastic abnormalities of the retinal arterioles [9]. The first sign of preeclampsia is focal constriction of the retinal arterioles, which may develop into global narrowing as the condition worsens [12]. The retinal vascular anomalies

primarily affect the posterior pole and may be accompanied by localised or peripapillary retinal edoema. There could be patches of capillary nonperfusion and dilated retinal capillaries.

The **Keith Wagener Barker classification** [22] of hypertensive retinopathy can be used in this situation, with the exception that PIH and sclerotic AMD only include arteriole spasm.Occasionally, alterations take place, although with persistent hypertension, spasm and sclerosis are more common.

Stage 1 - Moderate tortuosity, sclerosis, and slight constriction of the retinal arterioles;

unnoticed hypertension

Stage 2: AV nicking; definite narrowing; focal constriction; sclerosis, if any, symptoms that could be related to blood pressure, but pressure is higher and maintained

Stage 3 of Retinopathy includes haemorrhages, arteriolosclerosis, and cotton-wool patches.higher and more persistent pressure; moderate headaches, dizziness, and anxiety heart, cerebral, and renal function decline.

Stage 4: Siegrist streaks and Elschnig spots, as well as neuroretinaledoema, including papilledema.chronically high blood pressure, headaches can also be associated.

Another classification has been given by **Scheie** is as follows,

The Modified Scheie Classification[(22)] of Hypertensive Retinopathy:[(12)]

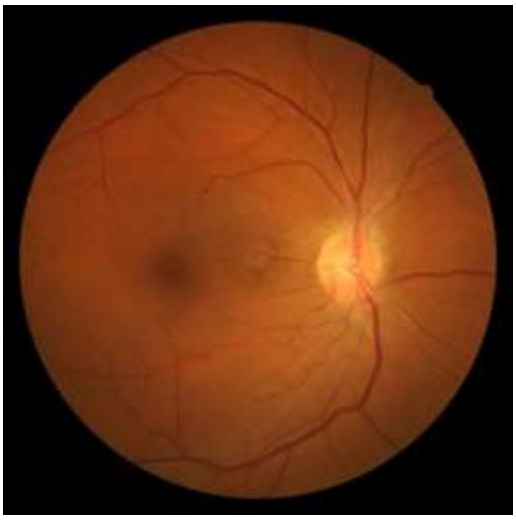
- **Grade 0**: No changes

 Grade 1: Barely detectable arterial narrowing

 Grade 2: Obvious arterial narrowing with focal irregularities

 Grade 3: Grade 2 plus retinal hemorrhages, exudates, cotton wool spots, or retinal edema

 Grade 4: Grade 3 plus papilledema



RE Fundus showing generalized arteriolar narrowing.

There are several categories for the clinical course of fundus alterations in PIH:

(i) **The first stage of spasticity**: Retinal arterioles spasm during this stage.

(ii) **The late stage of Retinopathy:**Characterised by cotton wool spots, microaneurysms, exudative retinal detachment, disc edoema, flame-shaped and splinter haemorrhages.

Three major signs: [23,24,25]

A. Arterio-venous crossing changes

B. Focal narrowing of vessels

C. Generalised attenuation sometimes associated with straightening of the arterioles.

There are other signs of less clinical significance when found in isolation but which may be of value as supporting evidence:

(i) Reduced translucency of vessel walls

(ii) Changes in vascular reflex

(iii) Sheathing

A.Arterio-venous crossing changes:

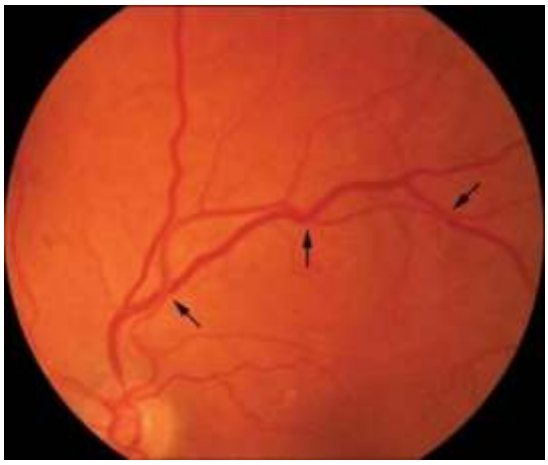
1)Gunn's sign : The vein is located in the periphery of the crossing.

It seems enlarged and dilated, as if circulation were, in some way, hampered; a "Banking" is a phenomenon, and aneurysm-like swellings can occasionally happen. While In some instances, a dilatation that appears both before and after an hour-glass constriction is visible following the crossing.

2)Salu's sign : Both the arteries and venules now cross inside at an oblique angle instead of their usual acute angle. These phenomena can be combined to create an image that is typically referred to as A-V nicking.

B. Focal narrowing of vessels

The sign shouldn't be taken positive unless it is present at least half a disc diameter from the disc's edge because the appearance is frequently seen in normal vessels when they emerge from the disc.



Focal narrowing seen in L/E

C. Generalised attenuation and straightening of the retinal arterioles:

A tonic contracture and generalised arteriolar sclerosis can both be diagnosed by observing a generalised narrowing of the retinal arterioles, which makes them appear considerably more attenuated than the veins. Vein narrowing also happens, albeit it's less noticeable. The height of diastolic pressure and the constriction of the arteriole diameter are significantly correlated.

The Stage Of Retinopathy

As the retinal arterioles become more constricted there are seen signs of retinal ischemia such as edema of retina, haemorrhages and exudates, etc.

A. Edema of retina:

Edema of the retina, which typically manifests at the upper and lower poles of the disc and progresses away from the disc along the course of retinal vessels (which is similar to the general course of the nerve fibres of the retina)[23,24,] further involves the macular area, is the first sign of involvement of the retina.

B. Haemorrhages :

They are of 2 types –

1) Flame shaped or superficial
2) Dot Blot or deep

1) Flame shaped or superficial

The haemorrhages typically seem flame-shaped and are located in the superficial nerve fibre layer. They typically occur in the posterior portion of the fundus. Blood flows out in a fan-like pattern along the striate channel of the nerve fibre layer. They originate from retinal capillaries and are typically found close to the disc or a few disc diameters away from it. They could be connected to exudates. It is a striking shade of red. It vanishes after 6 to 8 weeks.

2) Dot Blot or deep

Although they are less common, deeper haemorrhages have a more rounded, blot-like appearance. Blood is squeezed together between the structures in the deeper nuclear or plexiform layers, giving the tissue a more rounded or blotlike appearance. A more severe hypertensive state is suggested when these haemorrhages are present. The most likely cause of retinal haemorrhage is compromised capillary endothelium integrity, which allows extravasations past the compromised cell structures. 19 It is a dark crimson colour and has a circular form. Its origin is either capillary or venous. It endures for a longer amount of time**.**

C. Exudates :

They are of 2 types :

1) **Cotton wool spots or soft exudates :**The most severe or "accelerated" variety of hypertension is characterised by soft exudates or "cotton wool patches." These exudates are white grey patches that typically range in size from 1/3 to 1/2 of a disc and are located superficially in the layer of nerve fibres. They can be single

or many, and they are often sparing of the 18 macula and peripheral retina, appearing at the posterior pole in the tissues surrounding the optic disc. Although they can happen without retinal haemorrhages, they are sometimes related to them.

2) **Hard exudates :**They appear as distinct white spots that are located in the deeper layers of the retina, such as the henle's layer or outer plexiform layer close to the macula. They are frequent in the region between the macula and the optic disc. It may create a partial or full star shape known as a "macular star" or "macular fan" when it encircles the macula. In the spaces occupied by pre-existing soft exudates or haemorrhages, hard exudates do not form. On a microscopic level, they are made up of a group of lipid-filled macrophages.

D. **Papilloedema:**

Papilloedema develops when there is chronic angiospasm and a significant rise in blood pressure. Due to the number of nerve fibres, the upper and lower poles are first affected, followed by the remaining portion. The surrounding retina may be affected by the disc's oedema.

Fundus showing retinal haemorrhages, hard exudates and Cotton wool spots.

Management

A woman who has toxaemic retinal abnormalities is extremely sick. If she is well within the preorganic stage, will respond to conservative therapy, and the pregnancy may be prolonged under strict monitoring if the findings are limited to arteriolar attenuation. Rest, sedative, and moderate hypertensive medications should be the mainstays of treatment.

Pregnancy should be discontinued if acute angiospastic phenomena appears. If the pregnancy is carried on, the mother's vascular and optical systems will be harmed, and there is a chance that the foetus will die. In most instances, treatment ends with positive outcomes, a swift resolution of visual alterations, and a full resolution of visual acuity. The future seems bright for the mother's life as well.

RESULT

RESULT

TOTAL NUMBER OF PATIENTS: 84

AGE RANGE: 18-42 YEARS

AGE (YEARS)	NUMBER	PERCENTAGE
<20	3	3.57%
20-30	68	80.95%
30-40	12	14.28%
>40	1	1.20%
TOTAL	84	100%

TABLE 1: DISTRIBUTION OF THE PATIENTS ACCORDING TO AGE

A total of 84 patients were included in the study with Mean age± SD of 27.08±2.36 years.Maximum number of HDP cases i.e 80.95% were found in the age group of 20-30 years. This may be the case because majority of pregnant females are in the same age group.

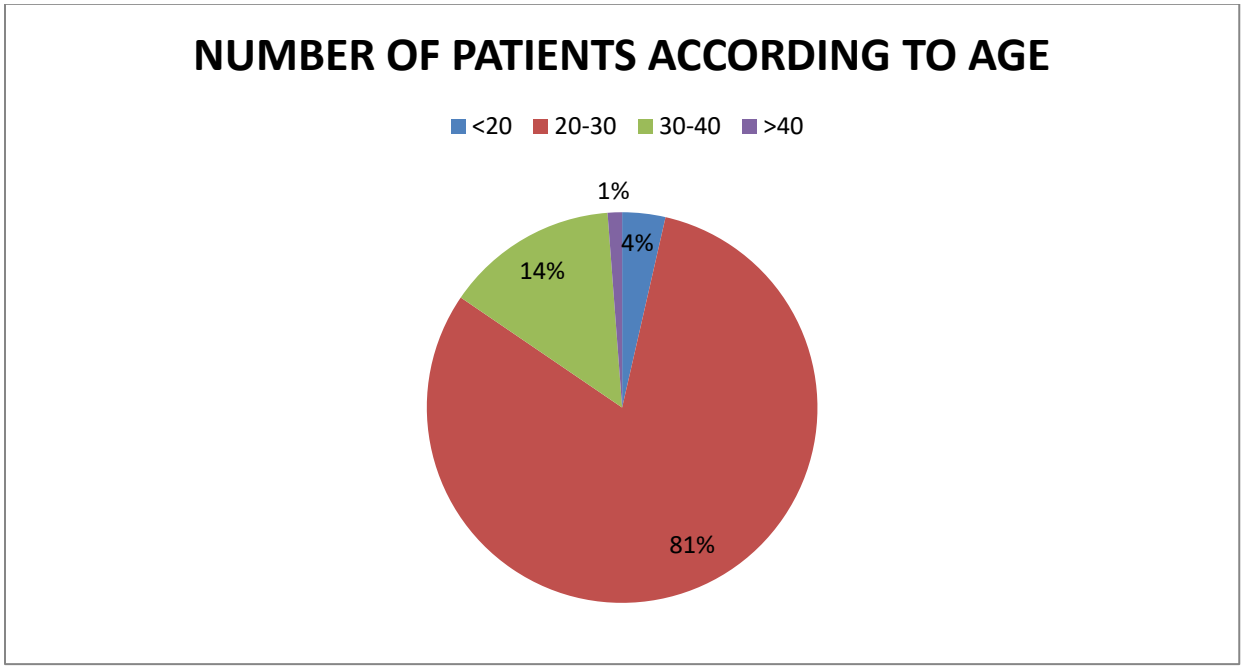


FIGURE 1: DEPICTING DISTRIBUTION OF PATIENTS ACCORDING TO AGE GROUP (n=84)

DIST. OF PARITY	PATIENTS INCLUDED	PERCENTAGE
PRIMIGRAVIDA	58	69.04%
MULTIGRAVIDA	22	26.20%
GRAND MULTI-GRAVIDA	4	4.76%
TOTAL	84	100%

TABLE 2: DISTRIBUTION OF THE PATIENTS ACCORDING TO GRAVIDA (n=84)

69.04 % of the total HDP cases were found to be primigravidas. Rest 30.96 % included multigravida and grand multigravida. Hence suggesting that Hypertensive disorders of pregnancy are more common in primigravidas.

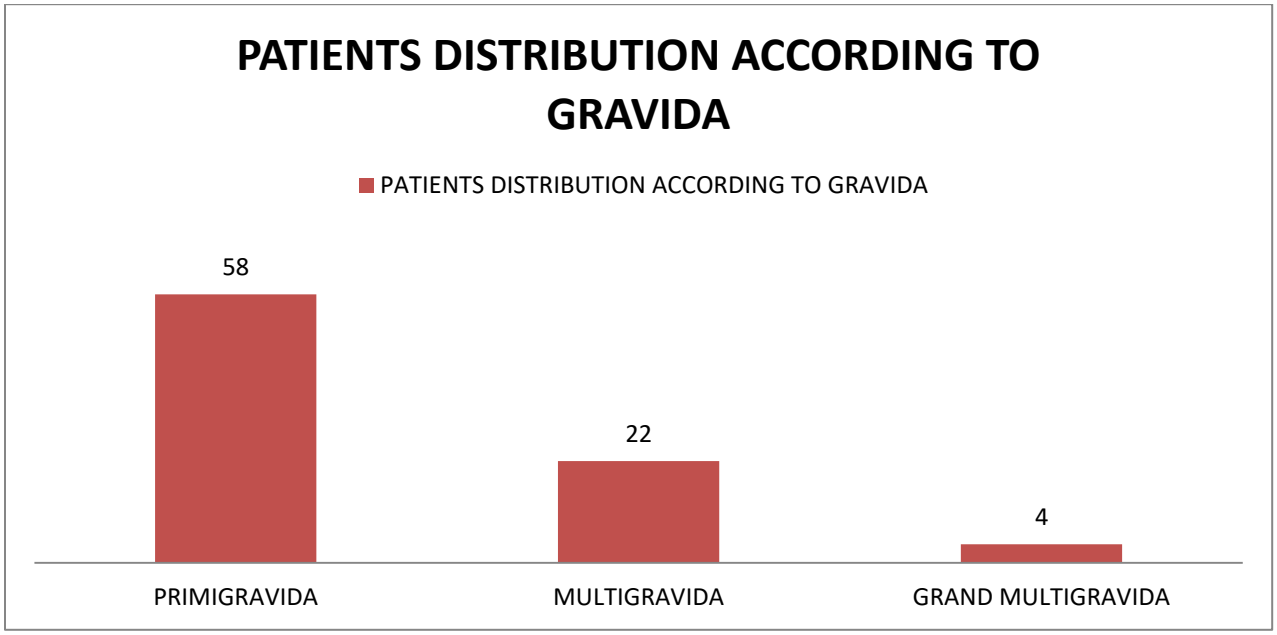


FIGURE 2: DEPICTING DISTRIBUTION OF PATIENTS ACCORDING TO GRAVIDA (n=84)

GESTATION IN WEEKS	NUMBER	PERCENTAGE
30- 35 WEEKS	**62**	**73.80%**
36-41 WEEKS	**22**	**26.20 %**
TOTAL	**84**	**100**

Table 3 : Distribution of period of gestation in patients (n=84)

Maximum number of patients with HDP around 73.80 % were in the gestational age group of 30-35weeks at the time of presentation and rest around 26.20% are of more than 36-41weeks of gestational age.

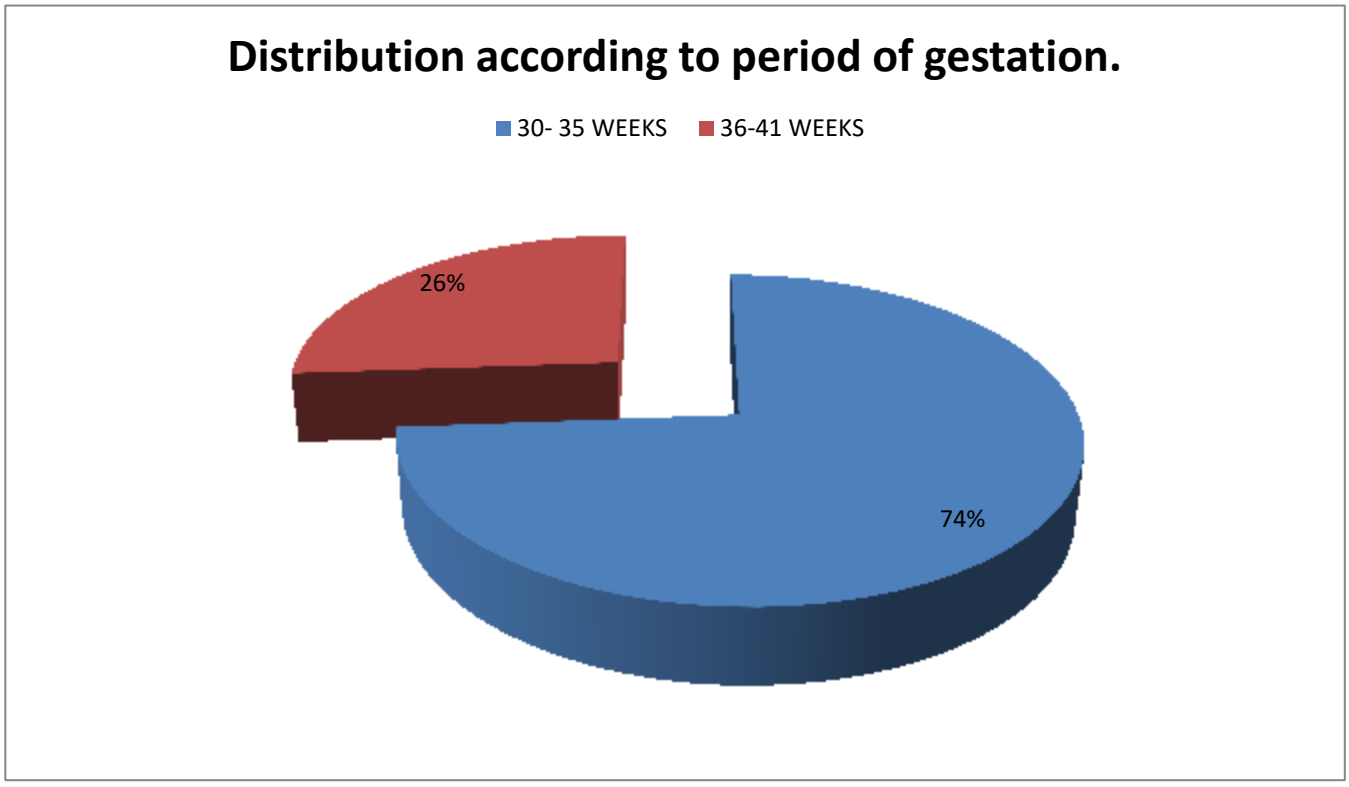


Fig 3 : Distribution of period of gestation in patients (n=84)

SYSTOLIC BLOOD PRESSURE	PATIENTS INCLUDED	PERCENTAGE
LESS THAN 160 mmHg	52	61.90%
MORE THAN 160 mmHg	32	38.10%
TOTAL	84	100%

TABLE 4: SYSTOLIC BLOOD PRESSURE OF THE PATIENTS INCLUDED IN THE STUDY.(n=84)

Out of the total 84 patients included in the study 61.90 % had systolic blood pressure less than 160 mmHg and 38.10 % patients had systolic blood pressure more than 160 mmHg. Mean Systolic Blood Pressure±SD , 155.28±8.50 mmHg.

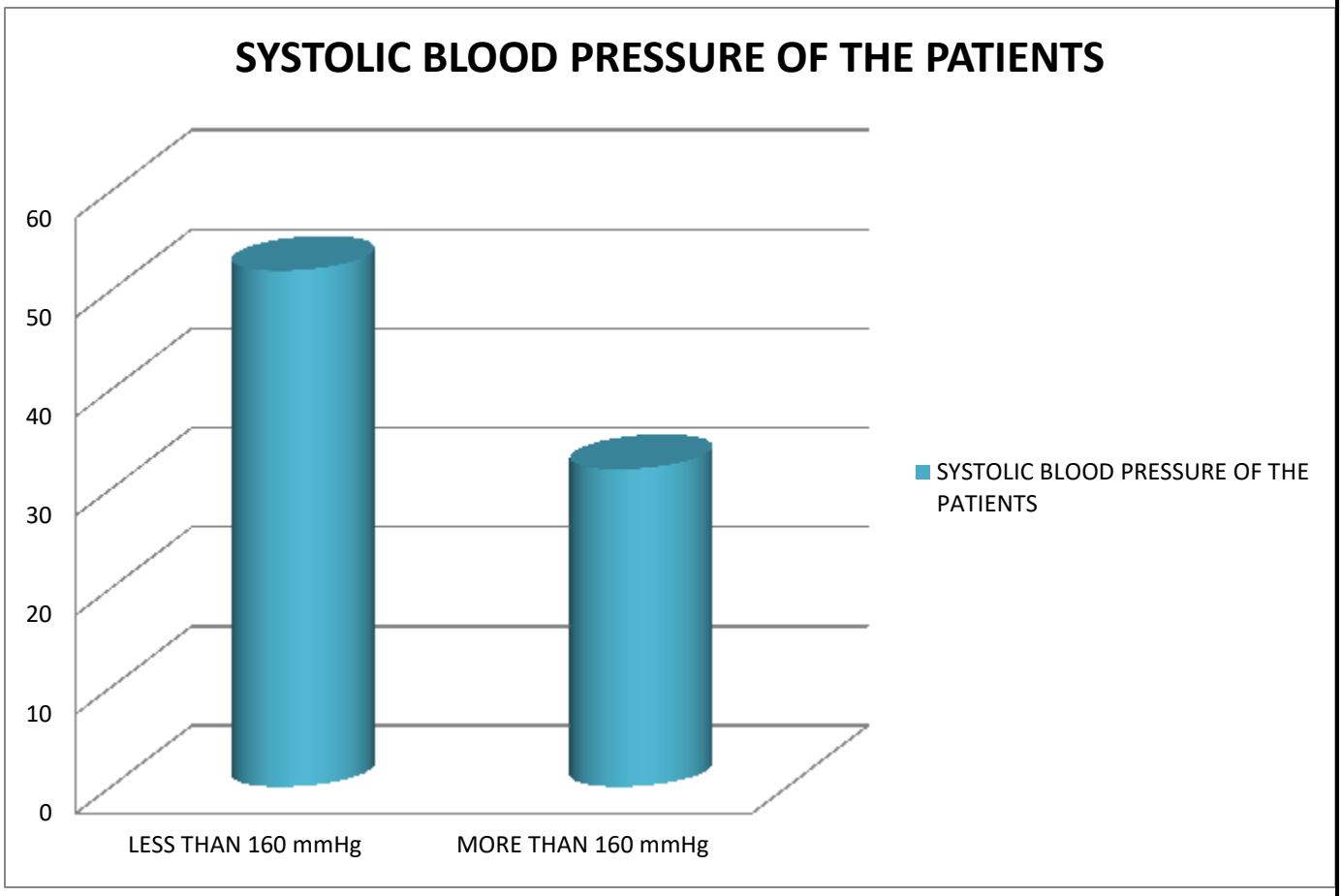


FIGURE 4: DEPICTION OF SYSTOLIC BLOOD PRESSURE OF THE PATIENTS INCLUDED IN THE STUDY(n=84)

DIASTOLIC BLOOD PRESSURE	PATIENTS INCLUDED	PERCENTAGE
LESS THAN 110 mmHg	31	36.90%
MORE THAN 110 mmHg	53	63.10%
TOTAL	84	100%

TABLE 5: DIASTOLIC BLOOD PRESSURE OF THE PATIENTS INCLUDED IN THE STUDY (n=84)

Among 84 patients 36.90% had diastolic blood pressure less than 110 mmHg and 63.10% had diastolic blood pressure more than 110 mmHg. Mean Diastolic Blood Pressure 101.33±9.5 mmHg.

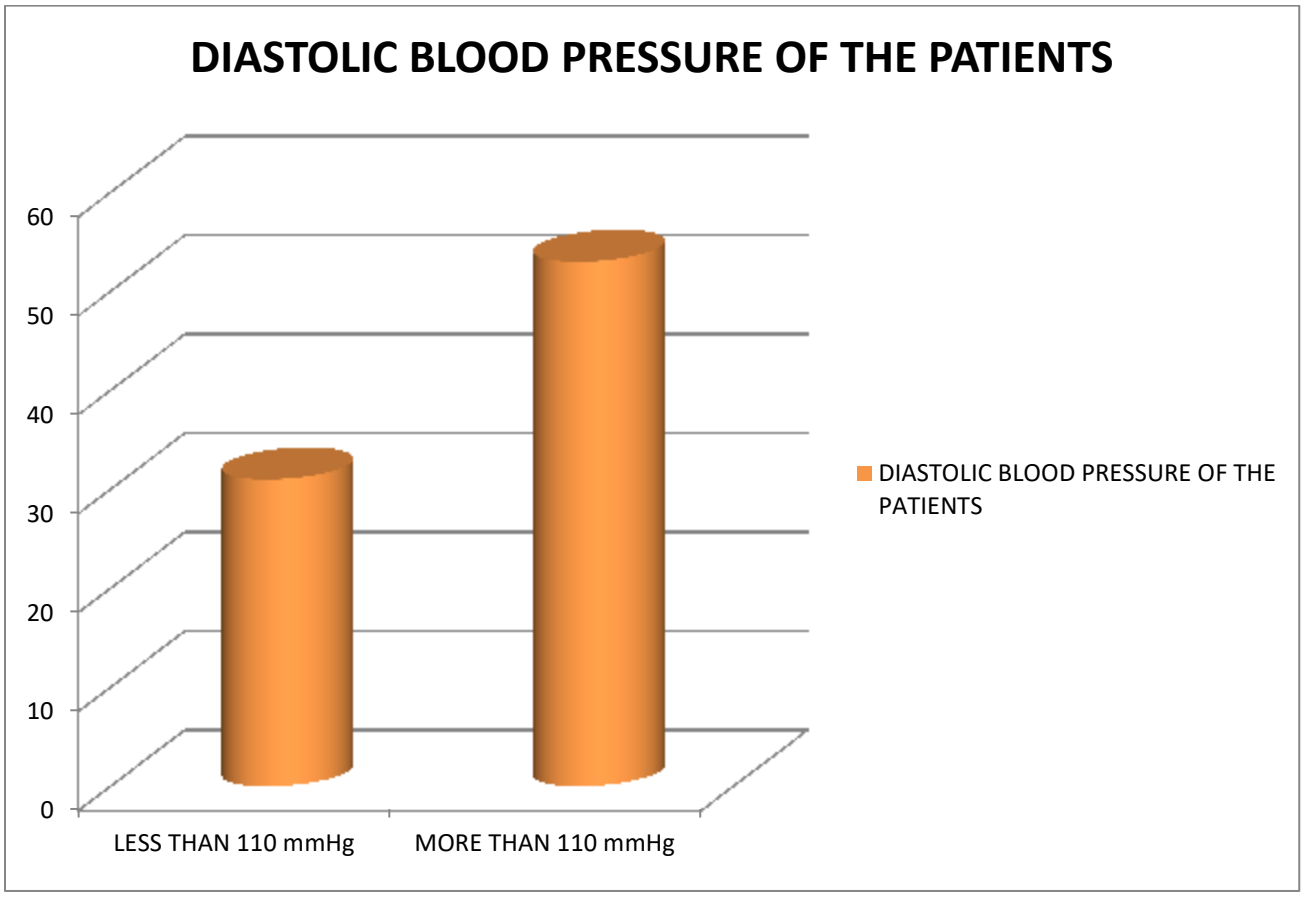


FIGURE 5: DEPICTION OF DIASTOLIC BLOOD PRESSURE OF THE PATIENTS INCLUDED IN THE STUDY (n=84)

SYMPTOMATIC PATIENTS	32	38.09%
ASYMPTOMATIC PATIENTS	52	61.91%
TOTAL PATIENTS	84	100%

TABLE 6: DISTRIBUTION OF SYMPTOMATIC AND ASYMPTOMATIC PATIENTS (n=84)

Out of total of 84 patients 38.09 % patients were symptomatic and 61.91% were the ones who did not have any complains. (n=84)

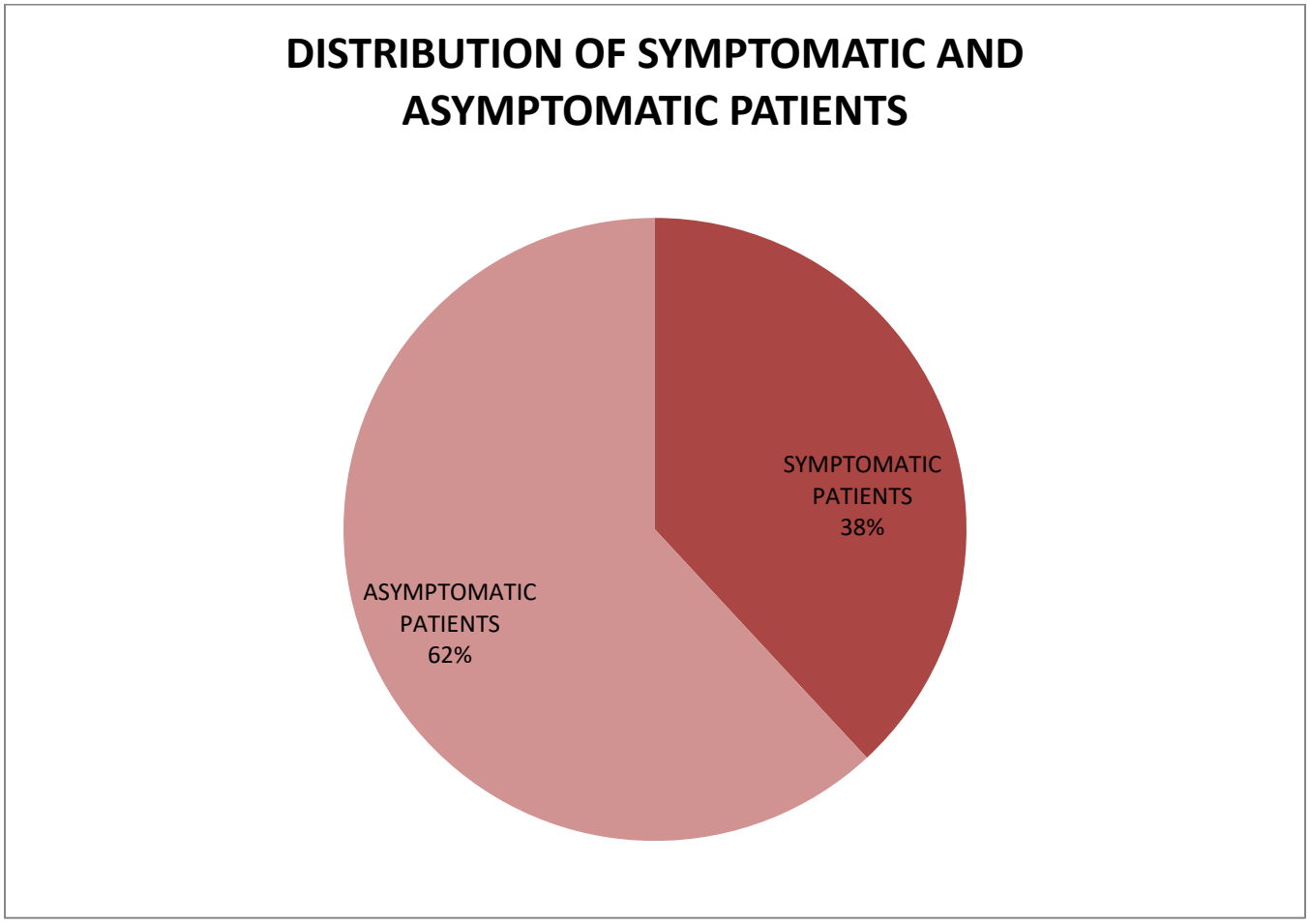


FIGURE 6 : DEPICTION OF SYMPTOMATIC AND ASYMPTOMATIC PATIENTS (n=84)

PREDOMINANT SYMPTOM	PATIENTS INCLUDED	PERCENTAGE
HEADACHE	18	56.25%
DIMINISION OF VISION	14	43.75%
TOTAL	32	100%

TABLE 7: DISTRIBUTION OF SYMPTOMATIC PATIENTS BASED ON PREDOMINANT SYMPTOMS(n=32)

Out of the total of 32 symptomatic patients 56.25% I.e. 18 females had a complain of headache and 43.75% i.e 14 had come with the complain of diminision of vision.

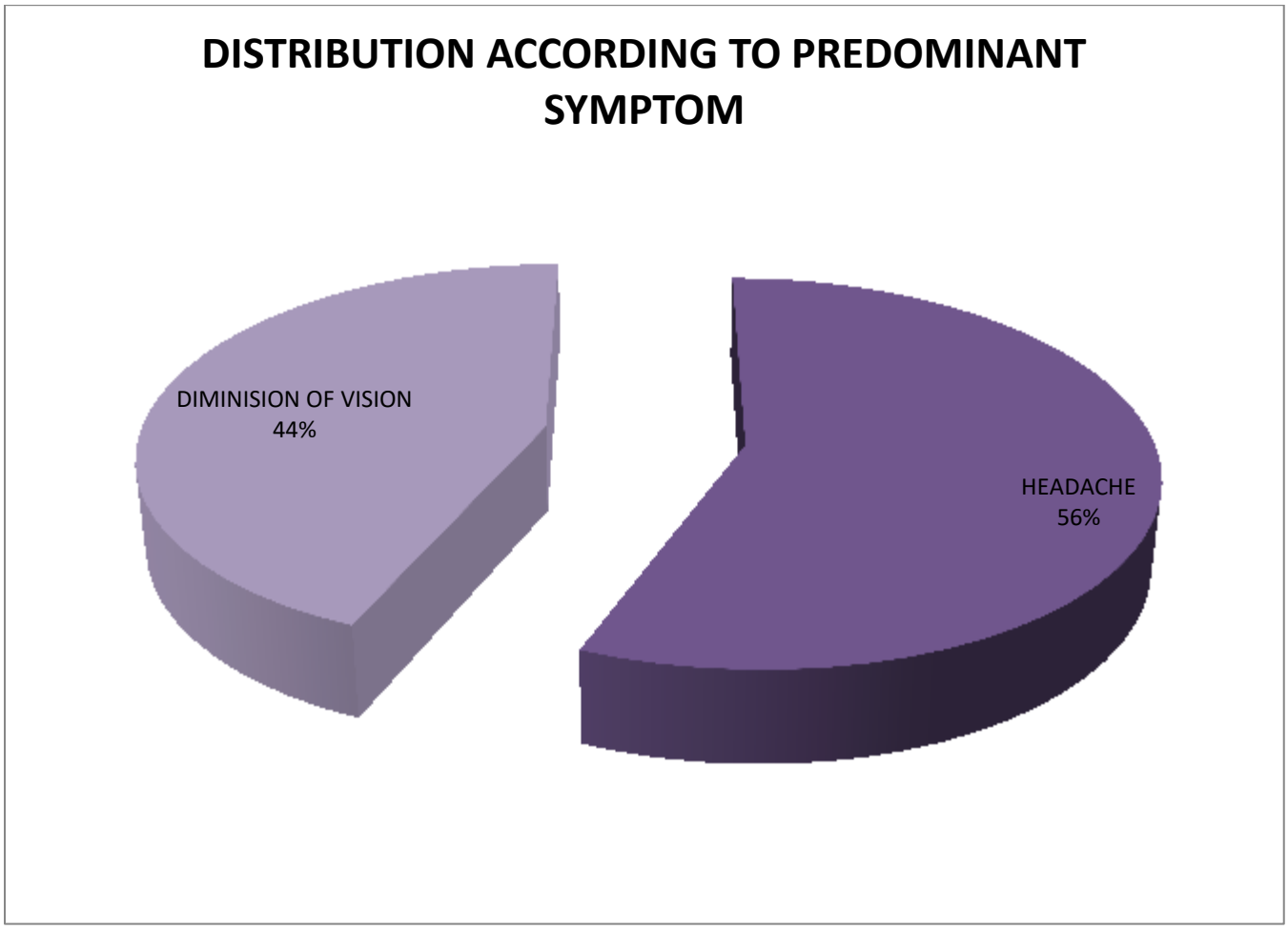


FIGURE 7 : DEPICTION OF SYMPTOMATIC PATIENTS BASED ON PREDOMINANT SYMPTOMS (n=84)

DISEASE	PATIENTS INCLUDED	PERCENTAGE

MILD PREECLAMPSIA	41	48.80%
SEVERE PREECLAMPSIA	28	33.35%
EECLAMPSIA	15	17.85%
TOTAL	84	100%

TABLE 8:GRADING OF THE PATIENTS ACCORDING TO DIAGNOSIS (n=84)

Among 84 participants 48.80% participants had mild Preeclampsia, 33.35% participants were found with severe Preeclampsia and 17.85% participants were found to have eclampsia.

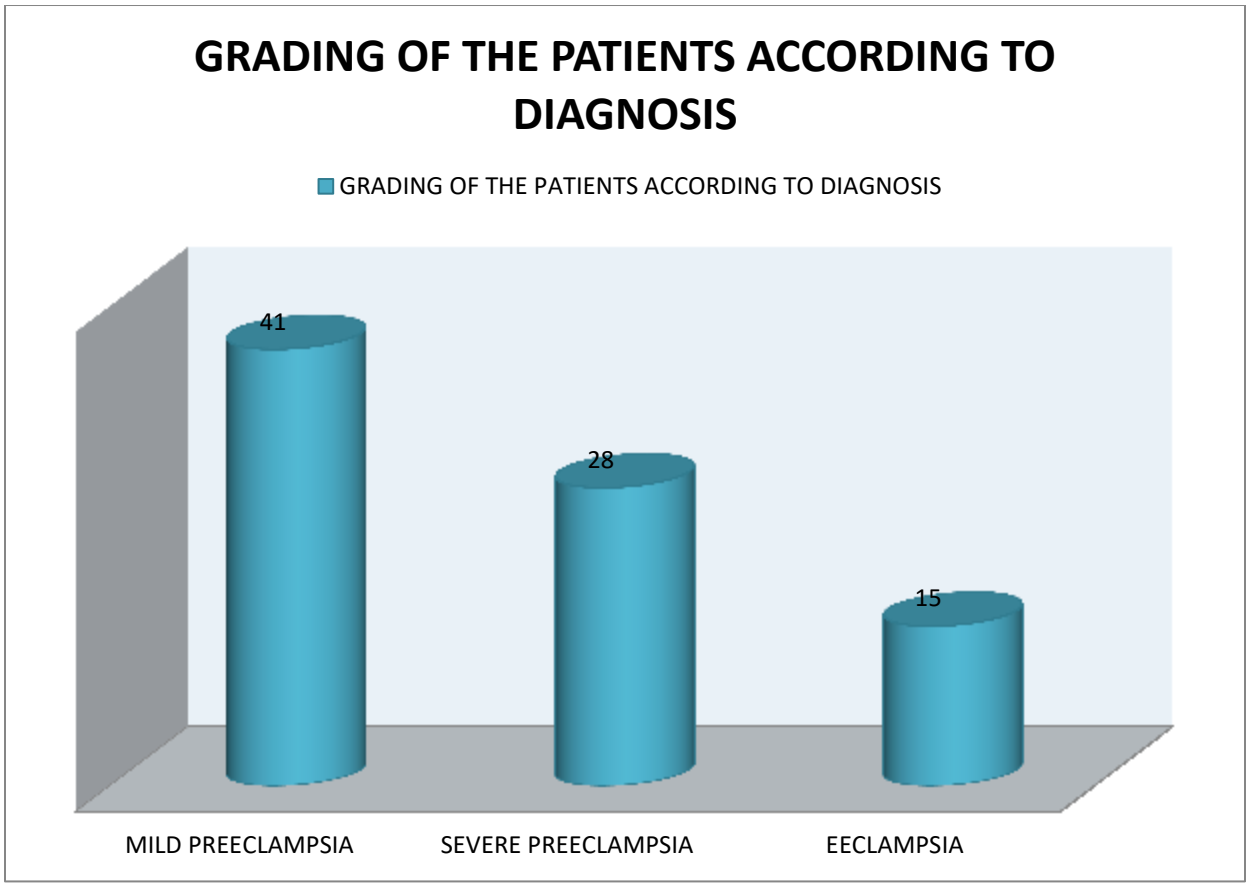
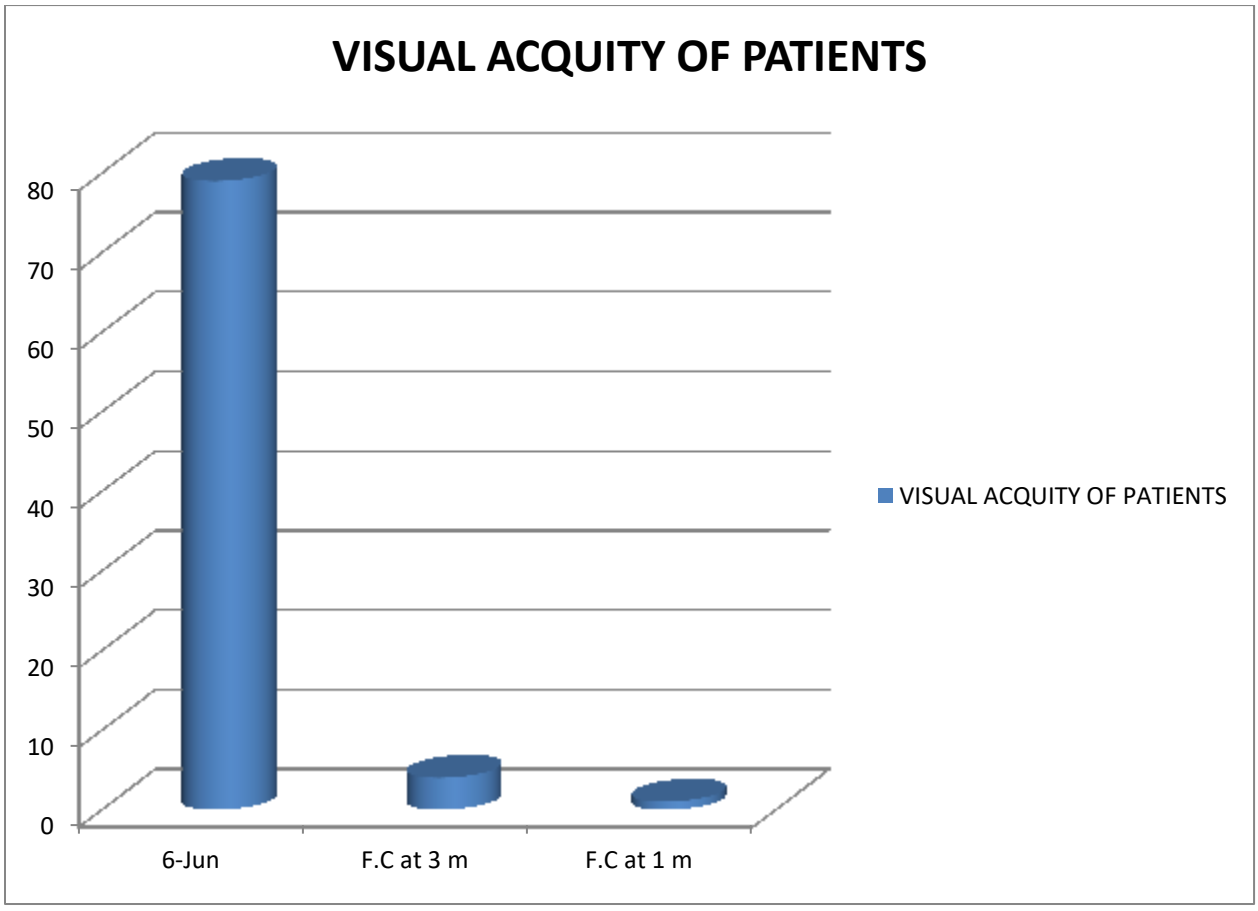


FIGURE 8:GRADING OF THE PATIENTS ACCORDING TO DIAGNOSIS (n=84)

VISUAL ACQUITY	NUMBER OF PATIENTS	PERCENTAGE
6/6	79	94.04%
F.C at 3 m	4	4.76%
F.C at 1 m	1	1.20%
Sum total	84	100%

Table 9: Visual acquity of patients included in the study.(n=84)

Out of all the 84 patients included in the study 94.04 % had a visual acquity of 6/6 and 4.76% had visual acquity of Finger counting at 3 meters. Only 1.20% had a visual acquity of F.C at 1 meter.



Graph 9: Depicting Visual acquity of patients included in the study.(n=84)

RETINAL CHANGES	PATIENTS INCLUDED	PERCENTAGE
NORMAL FUNDUS	43	51.20%
FUNDUS WITH POSITIVE FINDINGS	41	48.80%
TOTAL	84	100%

TABLE 10: DISTRIBUTION OF FUNDUS FINDINGS IN PATIENTS (n=84)

Out of all the patients included in the study 51.20% had no finding in the fundus. 48.80% patients had positive fundus findings.

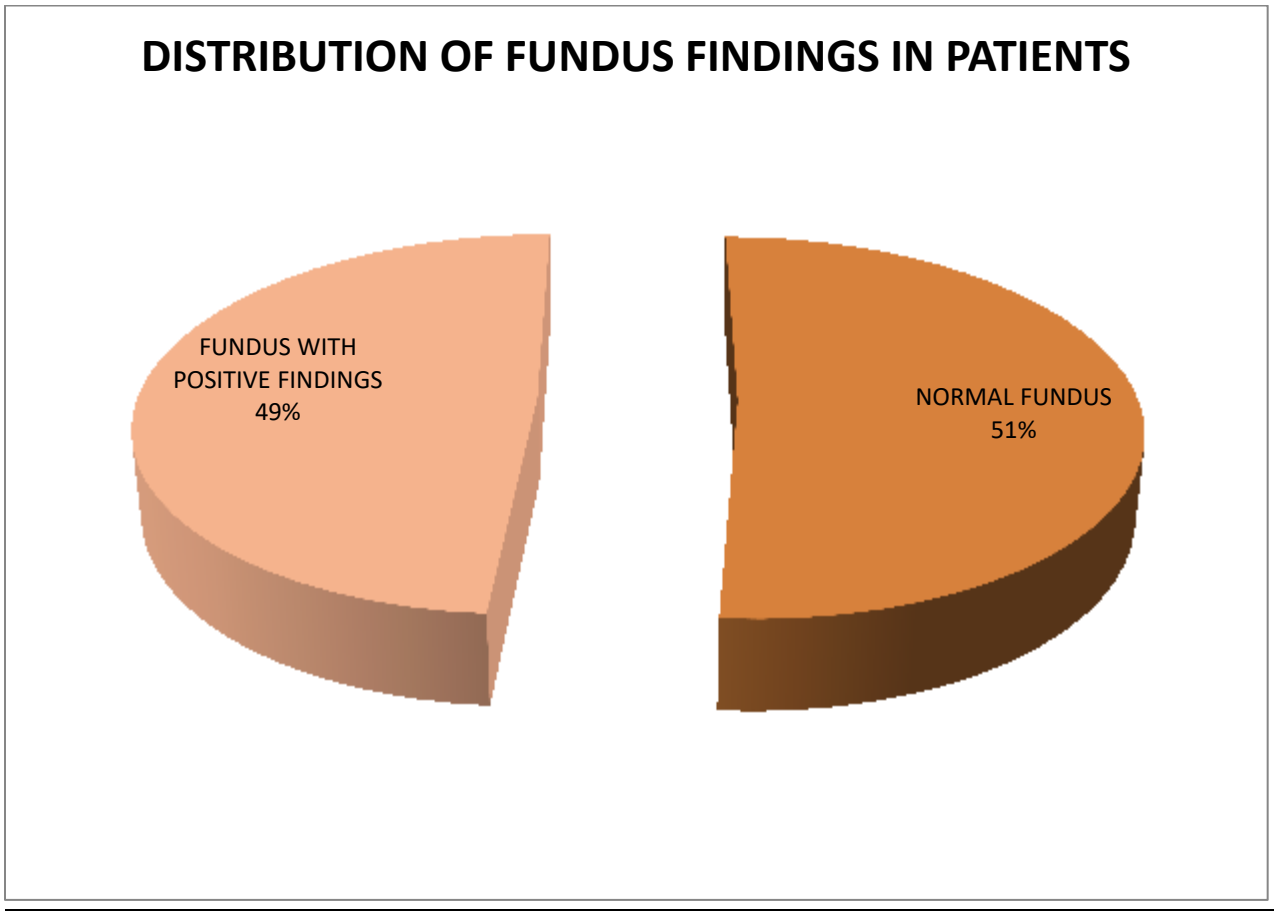


FIGURE 10 : DISTRIBUTION OF FUNDUS FINDINGS IN PATIENTS

GRADING	PATIENTS INCLUDED	PERCENTAGE
GRADE I	21	51.20%
GRADE II	12	29.26%
GRADE III	6	14.64%
GRADE IV	2	4.9%
TOTAL	41	100%

TABLE 11: DISTRIBUTION ACCORDING TO GRADING OF RETINAL CHANGES IN PATIENTS

Among all the participants 41 patients had hypertensive retinopathy changes out of which 51.20% had grade 1 hypertensive retinopathic changes , 29.26% had grade 2 retonopathic changes , 14.64% had grade 3 and only 4.9% had grade 4 retinopathic changes.

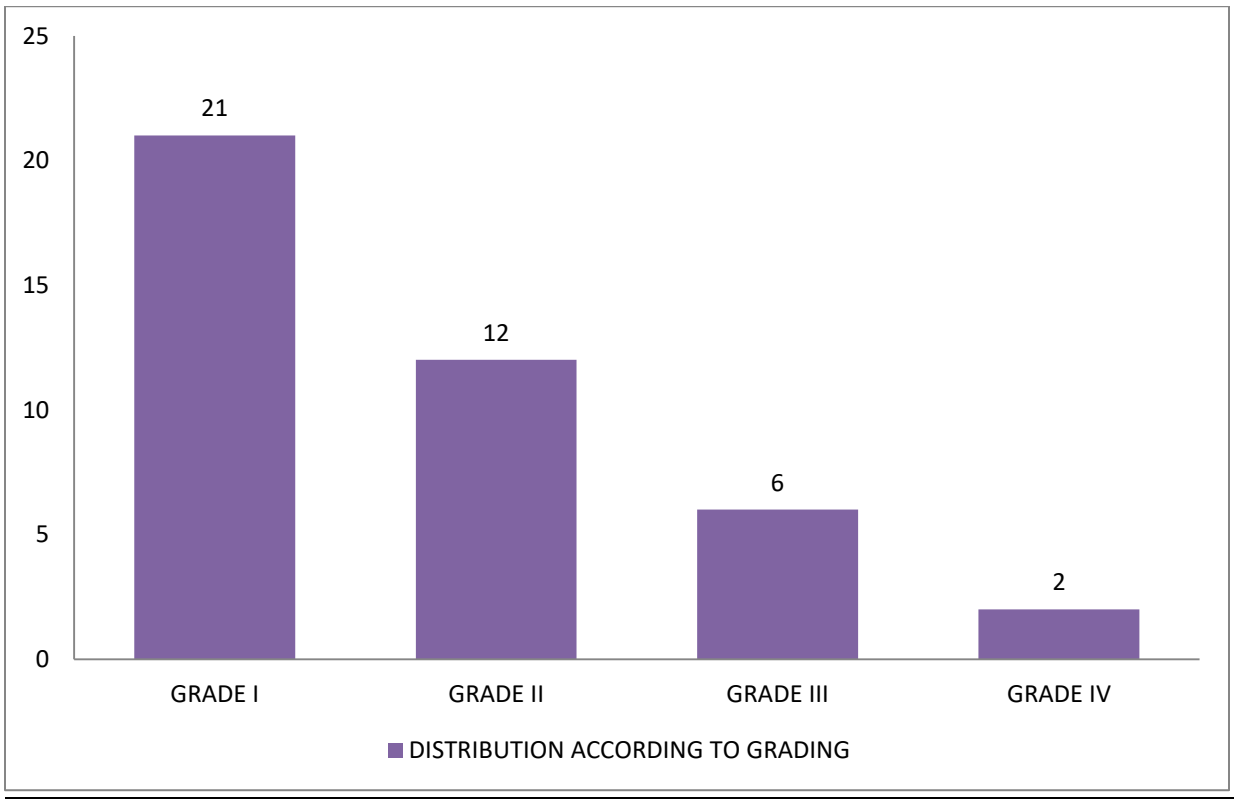


FIGURE 11: DISTRIBUTION ACCORDING TO GRADING OF RETINAL CHANGES IN PATIENTS

Figure below showing the distribution of various patients according to the grading of retinopathy.

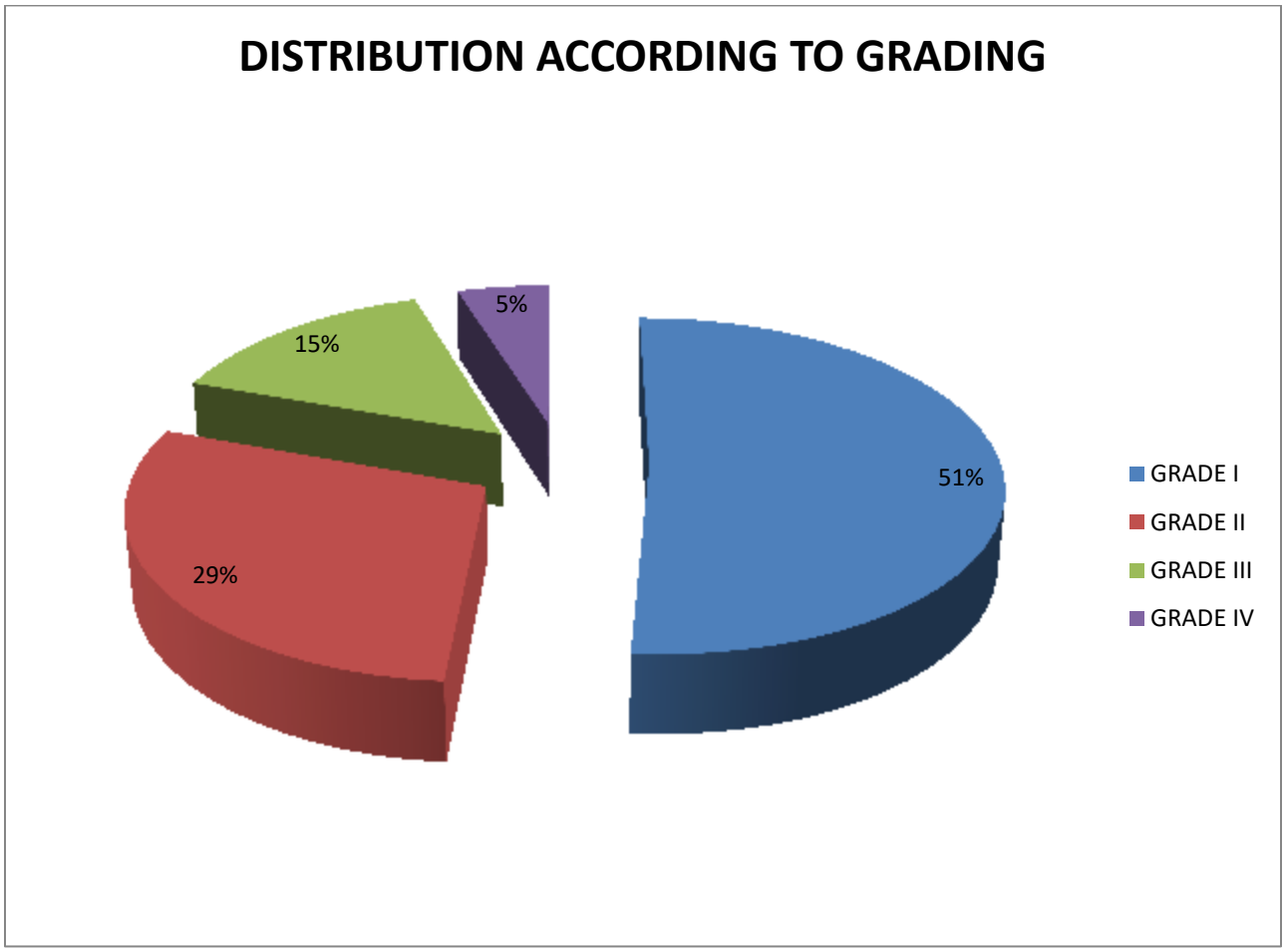


FIGURE 12: DISTRIBUTION ACCORDING TO GRADING OF RETINAL CHANGES IN PATIENTS

AGE GROUPS	NORMAL	GRADE I	GRADE II	GRADE III	GRADE IV	PERCENTAGE	P value
<20	2(4.66%)	0(0%)	0	1(16.67%)	0	3.67%	<0.001
20-30	33(76.74%)	18(85.57%)	10(83.33%)	5(83.33%)	2(100%)	79.97%	<0.001
30-40	8(18.60%)	2(9.73%)	2(16.67%)	0	0	14.88%	<0.001
>40	0	1(4.70%)	0	0	0	1.48%	<0.001
TOTAL	43(100%)	21(100%)	12(100%)	6(100%)	2(100%)	100%	

TABLE 12 : DISTRIBUTION OF AGE OF PATIENTS ACCORDING TO GRADING OF RETINOPATHY (p<0.001)

Out of 41 patients who had retinopathy changes, variations were seen in the grading of retinopathy. In the age group of 20-30 years 18 patients had grade 1 retinopathy, 10,5,2 had grade 2, 3 and 4 respectively. In the age group of 30-40 years 2females had grade 1 and other 2 had grade 2 retinopathy. Only 1 patient had grade 1 retinopathy in the age group of more than 40 years whereas no fundus had any finding in the age group less than 20 years possibly because of lesser patients being included in that age.P<0.001 using Significant Fischer Exact test.

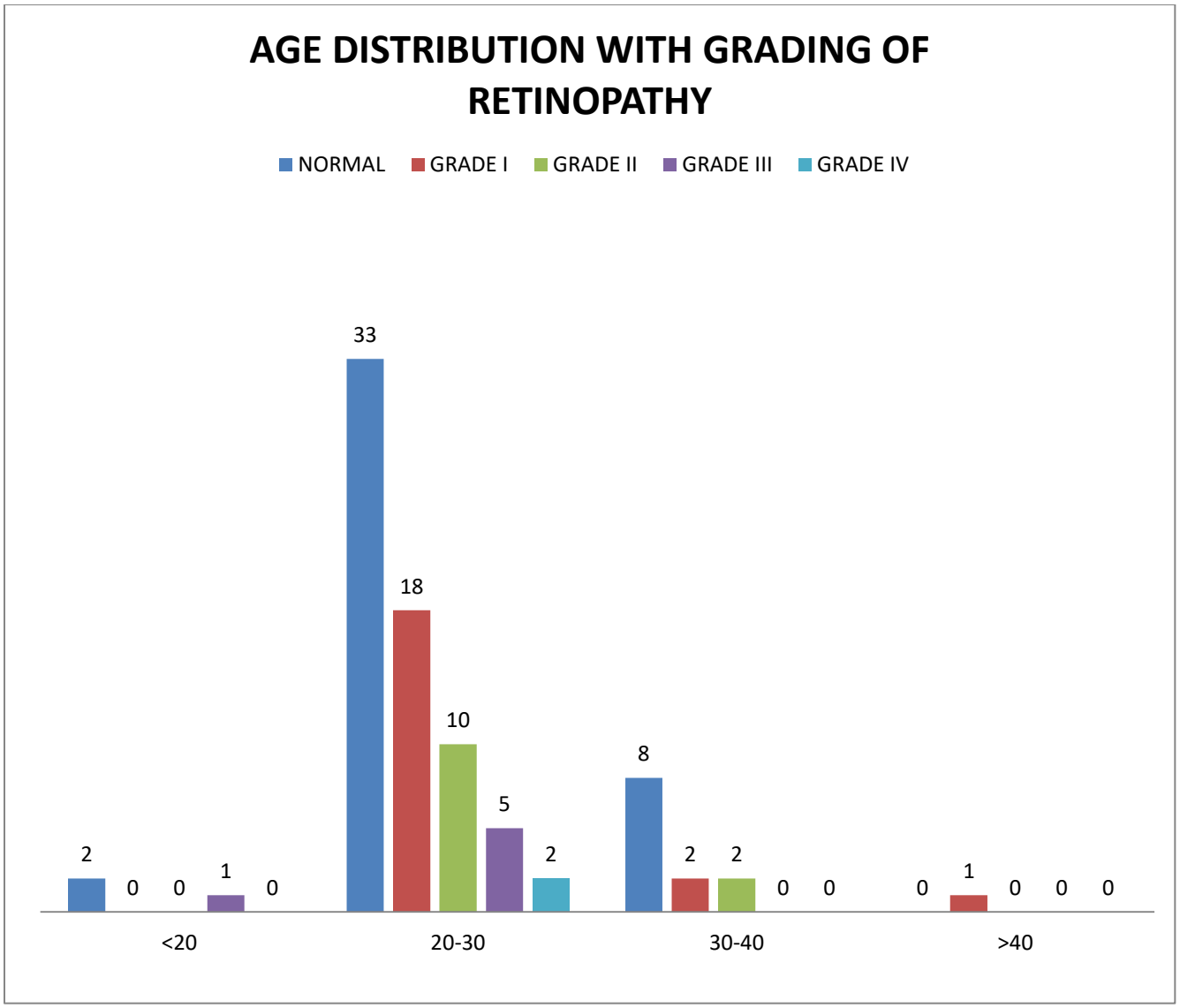


FIGURE 13 :AGE DISTRIBUTION WITH GRADING OF RETINOPATHY

The above figure is clearly depicting the variations in the grades of retinopathy changes in the various age groups. Maximum number of Retinopathy being seen in the age group of 20-30 years probably because of majority of females being included in this age group. P value <0.001 is significant.

DISEASE ENTITY	NORMAL	GRADE I	GRADE II	GRADE III	GRADE IV	PERCENTAGE
MILD PREECLAMPSIA	11 (25.60%)	5 (23.80%)	3 (25%)	0	0	22.62%
SEVERE PREECLAMPSIA	28 (65.10%)	14 (66.66%)	8 (66.65%)	4 (66.66%)	0	64.28%
ECLAMPSIA	4 (9.39%)	2 (9.54%)	1 (8.30%)	2 (33.34%)	2 (100%)	13.10%
TOTAL	43	21	12	6	2	100%

TABLE 13: DIAGNOSIS RELATED TO GRADING OF RETINOPATHY (n=84)(p<0.001)

The grading also differed with the type of disease. Out of 19 patients who had preeclampsia 5 showed grade 1 retinopathy and 3 showed grade 2 retinopathy. Out of 54 patients with severe pre eclampsia 14 females showed grade1, 8 showed grade 2 and 4 females showed garde 3 retinopathy . The proportion was less in the patients with eclampsia. Only 2 showed grade 1 and grade 3 retinopathy and 1 patient had eclampsia with grade 2 retinopathy changes.p value <0.001 is significant with Fischer exact test.

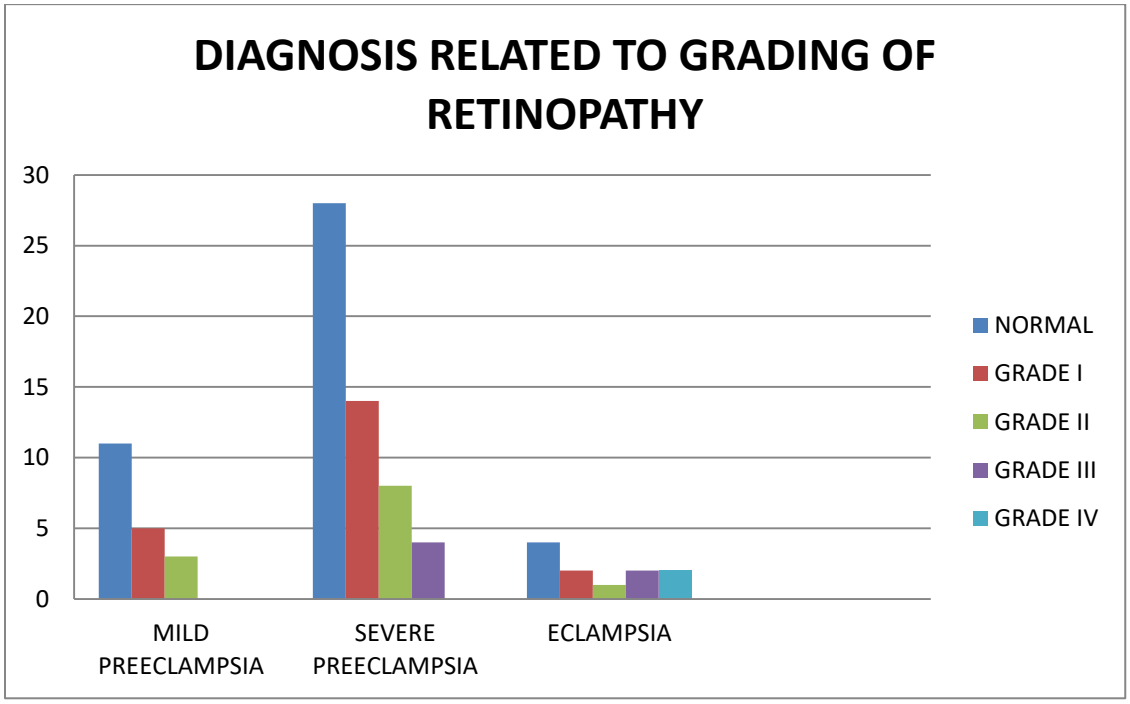


FIGURE 14 : DIAGNOSIS RELATED TO GRADING OF RETINOPATHY (n=84)(p<0.001)

PROTEIN IN URINE	PATIENTS NUMBER	PERCENTAGE	P value
1+	41	48.82%	<0.05
2+	27	32.14	<0.05
3+	11	13.09%	**<0.05**
4+	5	5.95%	<0.05
TOTAL	84	100%	

TABLE 14 : PROTEIN DISTRIBUTION OF THE PATIENTS (n=84)(p<0.05)

Out of the total patients included in the study all had proteinuria in which 48.82% had 1+ proteinuria , 32.14% had 2+ proteinuria , 13.09% had 3+ proteinuria and only5.95% had 4+ proteinuria. There was significant association seen withp value <0.05.

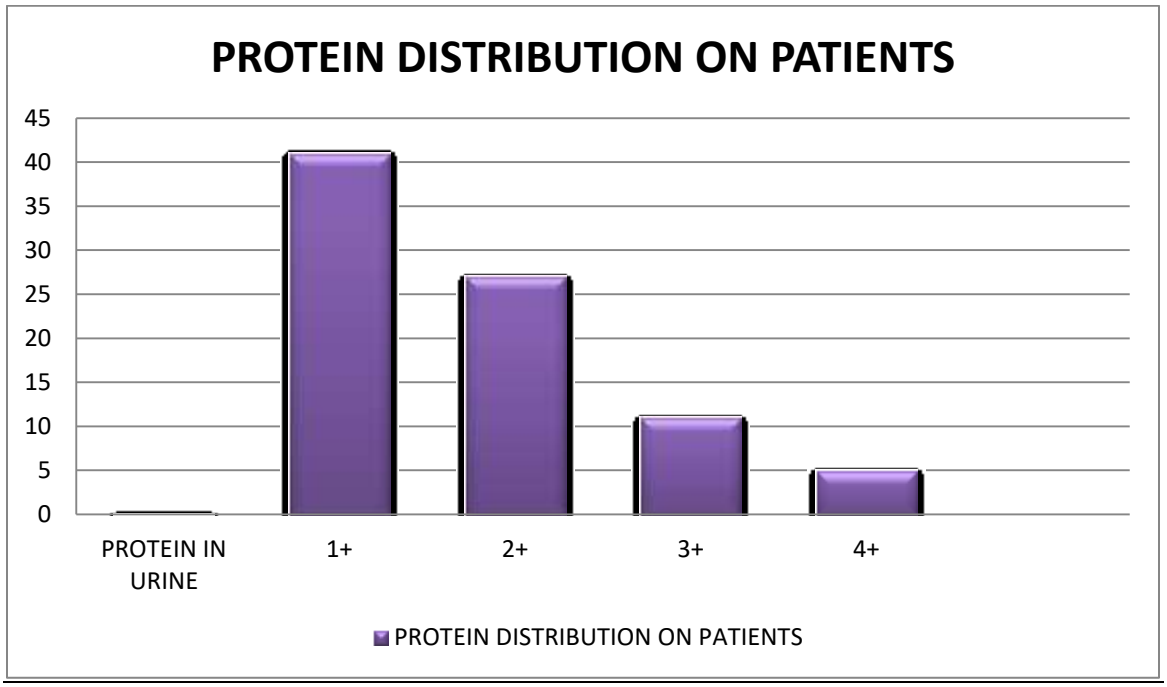


FIGURE 15: PROTEIN DISTRIBUTION OF THE PATIENTS

FUNDUS CHANGES	PATIENTS NUMBER	PERCENTAGE	P value
NORMAL	43	51.19%	<0.001
ABNORMAL:-	41	48.81%	<0.001
GRADE I	21	51.22%	<0.001
GRADE II	12	29.27%	<0.001
GRADE III	6	14.74%	<0.001
GRADE IV	2	4.77%	<0.001

TABLE 15 : FUNDUS FINDINGS IN THE PATIENTS

Out of total 84 patients included in the study, 43 had normal fundus andrest 41 i.e 48.81% had positive fundus findings. Other 41 patients had fundus changes which were graded accordingly.Significant correlation with p<0.001.

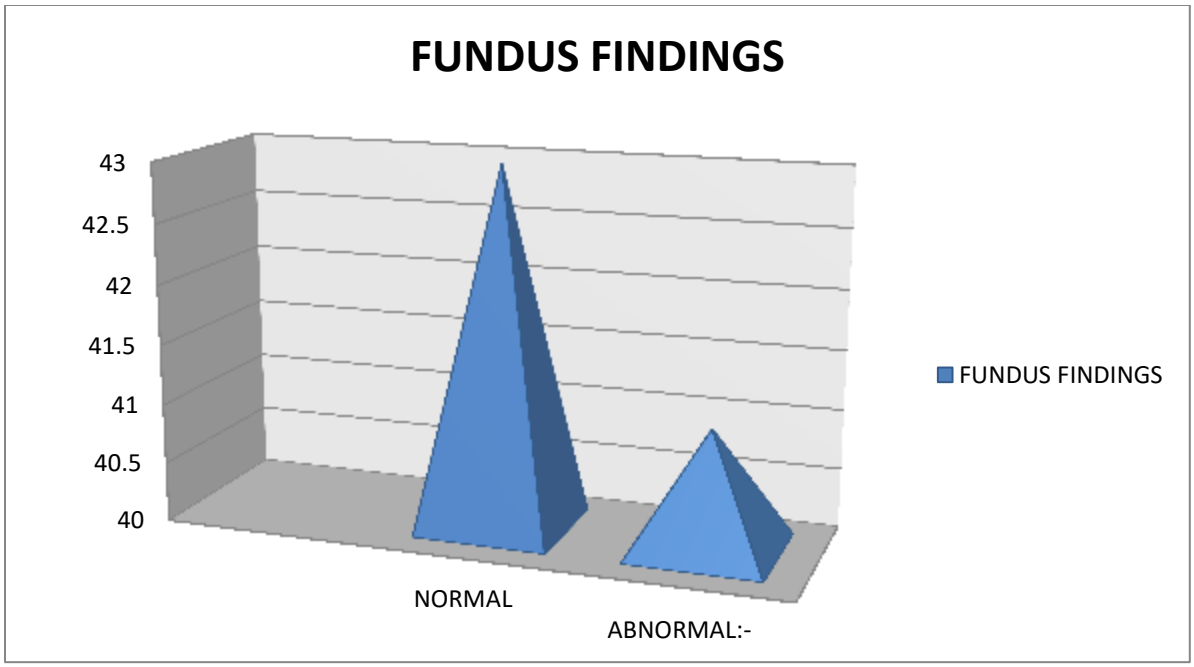


FIGURE 16: FUNDUS FINDINGS IN THE PATIENTS

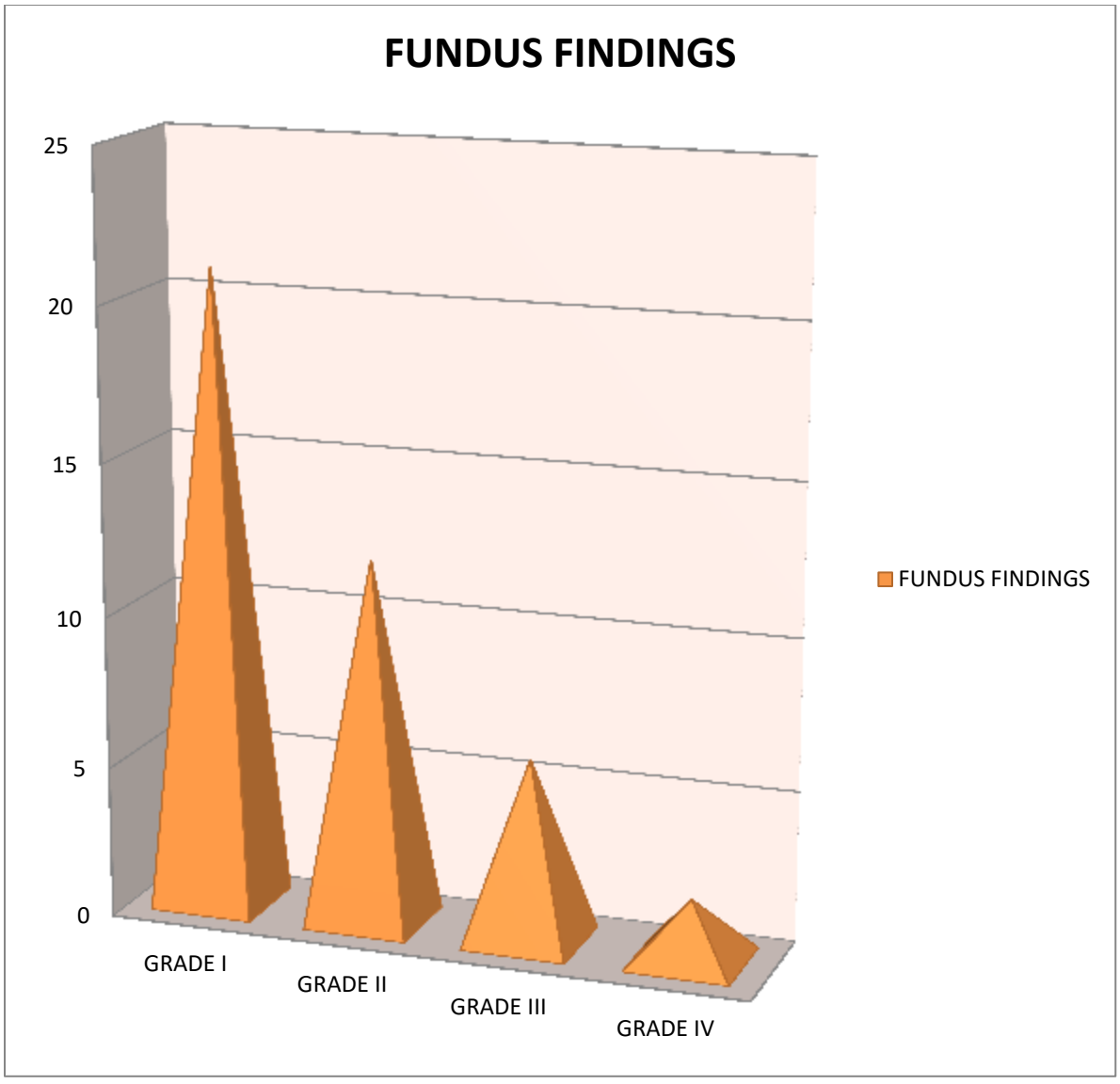


FIGURE 17: GRADING OF RETINAL CHANGES

Out of 41 patients ,51.22% had grade 1 changes of hypertensive retinopathy. 29.27% showed changes that were correlating to grade 2 changes. 14.74% and 4.77% had grade 3 and grade 4 respectively.

GRAVIDA	NORMAL FUNDUS	WITH POSITIVE FUNDUS FINDING	P value
PRIMI GRAVIDA	28	30	=0.99
MULTI GRAVIDA	3	9	=0.99
GRAND MULTI GRAVIDA	2	2	=0.99
SUM TOTAL	43	41	=0.99

TABLE 16 : FUNDUS CHANGES ACCORDING TO GRAVIDA(n=43) (p=0.99)

Out of total 41 patients with findings 30 patients were primigravida, 9 were multigravida and 2 were grand multigravida. The majority of females with fundus changes in hypertensive disorders of pregnancies are primigravida. P=0.99+, Significant Chi-Square test.

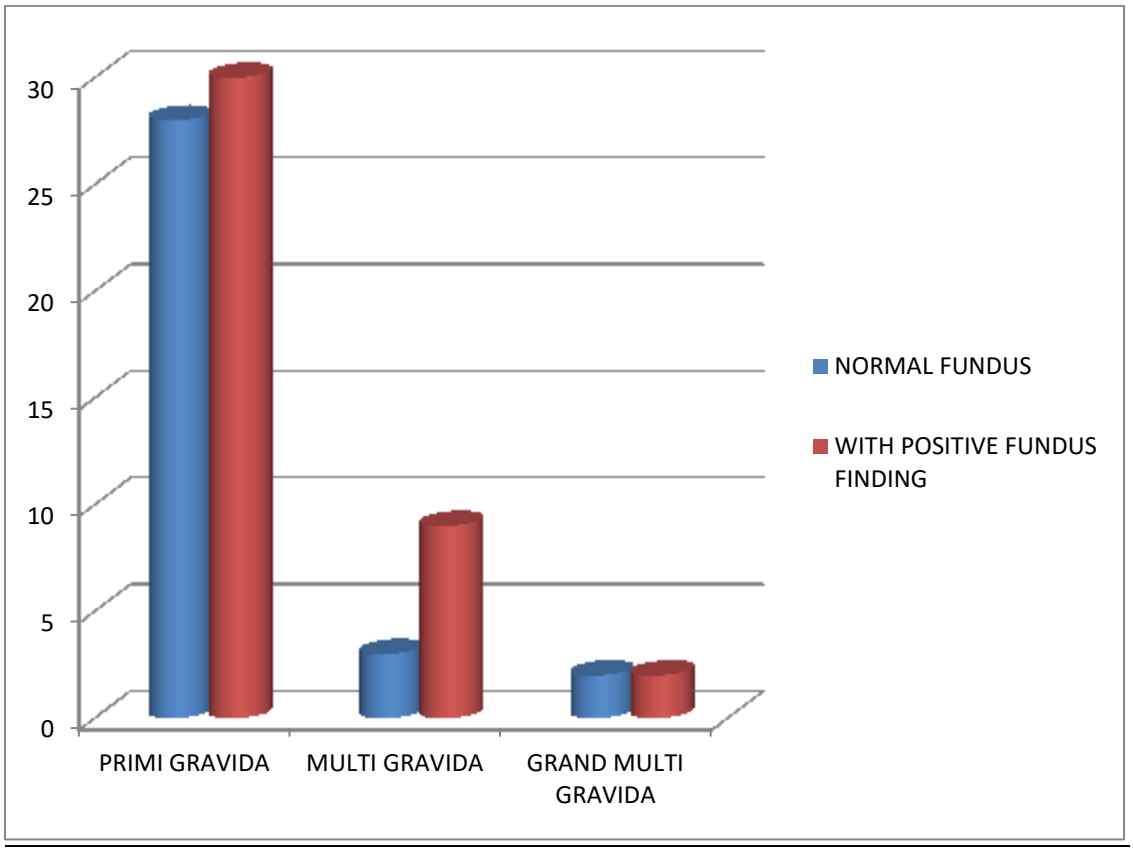


FIGURE 18: FUNDUS CHANGES ACCORDING TO GRAVIDA

Mean BP	No. of cases without changes	No. of cases with changes	P value
<160/110	**23 (53.4%)**	**9(21.95%)**	**<0.001**
>160/110	**15(34.8%)**	**32(78.04%)**	**<0.001**
TOTAL	**43**	**41**	**<0.001**

TABLE 17: Mean presenting BP levels.(n=43)(p value <0.001 significant chi square test).

According to our study, 78.04% of patients with fundus positive findings had blood pressure more than 160/110 mmHg and 21.95% had BP less than 160/110mmHg.Mean Pre SBP with normal fundus in patients is 155 There is a significant association between BP levels and fundus changes p value < 0.001.

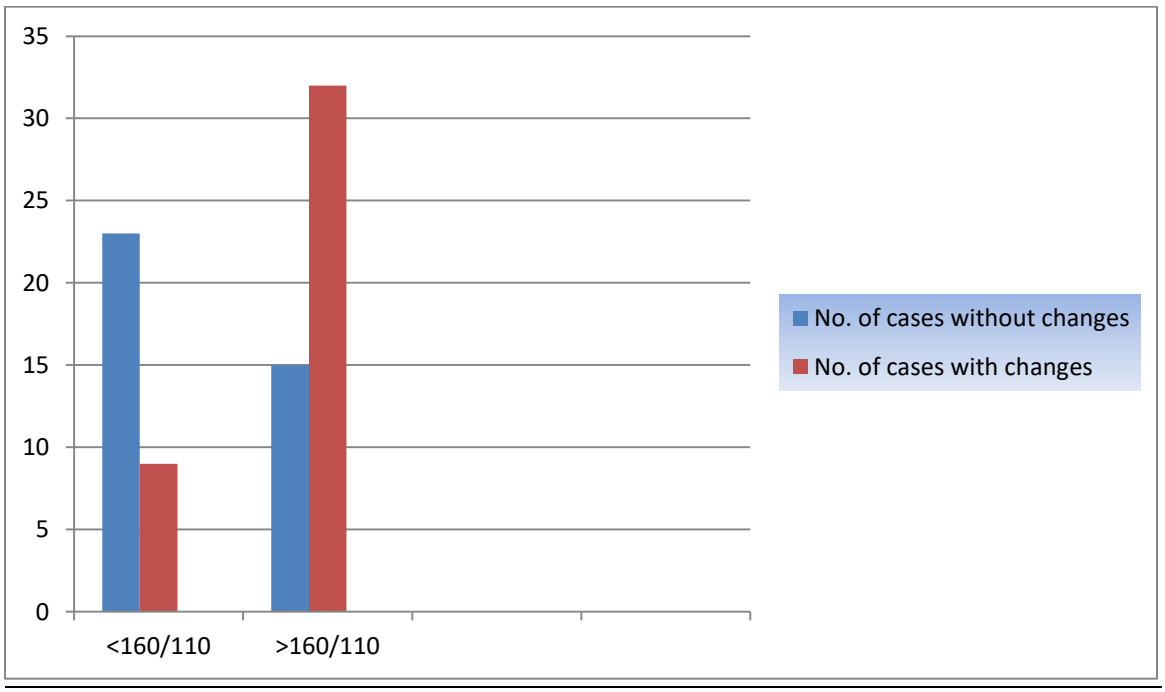


Figure 19 : MEAN PRESENTING BLOOD PRESSURE LEVELS (p<0.001)

DISCUSSION

DISCUSSION

According to several reports, the degree of hypertension correlates with the changes in retinal blood vessels. Numerous investigations have linked the evolution of retinal vascular alterations with fetal mortality and regarded them to be indicators of HDP that is becoming more severe. Due to the possibility that they reflect similar ischemia vascular changes in the placenta, these changes serve as a guideline for pregnancy termination. In order to assess the fundus changes in patients with eclampsia and pre-eclampsia, this study was conducted.

AGE

The age group included in this study was 18-42 years. Out of all the 84 patients included in the study, age group of less than 20 years included 3 (3.57%) patients. Maximum number of patients were observed in the age group 20-30 years and that was 68 (80.95%). 12 (14.28%) were in the age group 30-40 years and only 1(1.20%) was in the category of age more than 40 years.

According to the study by NupurPednekar et al.(1) on study of fundus changes in pregnancy induced hypertension 82.3% patients were in the age group of 20-30 years which was comparable to maximum proportion of patients in the group 20-30 years in our study

.

DISTRIBUTION OF THE PATIENTS ACCORDING TO GRAVIDA

There has been variations in the distribution of HDP according to gravida in various studies. According to our study, 58 (69.04%) were found to be primigravidas and rest 30.96% were multi gravidas.

In study of prevalence of retinal changes in pregnancy induced hypertension by Upadhya D et al.(2) 68.5 % PIH cases were seen in Primi-gravidas and rest 31.5% were in multigravida patients. This was comparable to the results in our study**.**

SEVERITY OF HYPERTENSION

In our study of 84 participants 48.80% patients had mild Preeclampsia, 33.35% participants were found with severe Preeclampsia and 17.85% participants were found to have eclampsia.

In a study by Shah AP et al**. (3)** of 150 patients of PIH 61.33% had gestational hypertension, 32.67 had preeclampsia amd 6% had eclampsia .In another study of 150 patients by

JayashreeMP et al. (4) most of the patients had severe hypertension i.e. 71 (47.3%), 22.6 had mild hypertension and 32 (21.3%) had hypertension with seizures .Slight discrepancy in the result can be because of a larger sample size in their study.

DISTRIBUTION ACCORDING TO PROTEINURIA GRADING

Out of the total of 84 patients included in the present study all had proteinuria in which (41) 48.82% had 1+ proteinuria ,(27) 32.14% had 2+ proteinuria , (11) 13.09% had 3+ proteinuria and only (5) 5.95% had 4+ proteinuria.

In a study by A.J. Bhandari et al.(5) out of 100 cases 1+ proteinuria on urine dipstick method was observed in 49% patients.27% had 2+ proteinuria. 17% and 7% were respectively having 3+ and 4+ proteinuria.

The results were comparable to our study.

PREVALENCE OF FUNDUS CHANGES IN PATIENTS OF HDP

According to our study of 84 patients , 48.80 % patients i.e. 41 patients out of 84 had positive retinal changes. A lot of many studies have been done to see the prevalence of fundus changes in patients of hypertensive disorders of pregnancy previously referred to as pregnancy induced hypertension.

In a study by Tadin et al. (6) from Croatia similar results of prevalence of fundus changes were observed. They observed positive fundus findings in 45% of the patients included in the study.

In another study by Varija T et al.(7) 42.7% and another study by Rasdi et al.(8) 53.4% patients were observed with retinal changes which was again statistically comparable to our study.

Study of 78 patients by Reddy et al. (9) showed that fundus findings were present in 59%of the total sample size.

DISTRIBUTION ACCORDING TO VARIOUS GRADES OF HYPERTENSIVE RETINOPATHY

In our study, 21 patients out of total 84 patients i.e. 51.20% had grade I hypertensive retinopathy. 29.26% (12) had retinal changes that corresponded to grade II hypertensive

retinopathy . 14.64% and 4.9% individuals were observed to have grade III and grade IV changes respectively. 1 patient had serous retinal detachment who had grade 4 chnages of hypertensive retinopathy and the blood pressure was more than 160/110 mmHg. Termination of pregnancy was adviced in the patient and after 4 weeks of termination no disc edema was present. Arteriolar attenuation andhaemorrhages were the most common retinal changes in hypertensive disorders of pregnancy.

In a study conducted by S.C Reddy et al. (9) 52.46% of patients with hypertensive disorders of pregnancy showed grade I hypertensive retinopathy changes and 6.4 % showed grade 2 changes of hypertensive retinopathy.

In another study by RSudha et al.(10) of 70 patients 47.17% had grade 1 cahnges of hypertensive retinopathy and 6.15% had grade 2 changes. The proportion of females included in the grade 1 category of fundus changes was comparable because the majority of patients lie in this category of retinal changes .

FINDINGS FROM THE FUNDUS ASSOCIATED WITH SEVERITY OF HYPERTENSION AND PROTEINURIA

The results of the current study revealed a strong correlation between the levels of proteinuria, the severity of hypertension, and fundus abnormalities. This is comparable to the study of Tadin et al.(6) which found that the severity of preeclampsia and proteinuria were directly proportional to the degree of retinopathy(11). According to their research, examination of the fundus is an important and crucial diagnostic process in pregnant women with preeclampsia and that hypertensive retinopathy is a genuine and reliable predictive factor in evaluating the severity of preeclampsia. They also observed a strong correlation between the emergence of edema and hypertensive retinopathy.

According to S.C. Reddy et al.(9) blood pressure and proteinuria statistically correlated with hypertensive retinopathy [8]. The severity of the retinopathy was proportional with the degree of preeclampsia,with which our study was consistent.

A study by Prabhajan Kumar P.(12) and colleagues found a strong correlation between fundus alterations , proteinuria and the degree of hypertension

All these studies were in accordance with our observation.

ASSOCIATION BETWEEN FUNDUS CHANGES AND BLOOD PRESSURE

In our study of 84 patient 41 showed positive fundus findings for hypertensive retinopathy out of which 32 (78.04%) patients had systolic blood pressure of more than 160 mmHg and all of them showed fundus changes. Though the grading of hypertensive retinopathy varied. Our study shows significant association between systolic blood pressure and fundus changes.

Statistically significant association between the presence of retinal changes and blood pressure was observed in various other studies by Reddy et al.(9) , Varija T et al. (7) , Krishnakumar S et al.(13) and Shah AP et al. (3).

FUNDUS CHANGES AND UREA LEVELS IN BLOOD

According to Tandon& Kishore's (14) study, the mean blood urea level in mild preeclampsia was 24.6 mg%, whereas the amount in eclampsia was 43.4 mg%12. The current study, which demonstrates a strong correlation between blood urea levels and the severity of hypertension and fundus alterations, is consistent with this.study.

CONCLUSION

CONCLUSION

All of the body's physiological and biochemical factors are impacted by pregnancy, which is a physiological state. Even in developed nations, hypertensive disorders of pregnancy is one of the main causes of maternal and foetal morbidity and mortality. Primigravidas are most likely to experience pregnancy-induced hypertension.

According to several studies, the degree of hypertension correlates with the changes in retinal blood vessels. Various studies have correlated the development of retinal vascular alterations with both maternal and foetal outcomes and considered it as an indicator of increasing PIH severity. These modifications serve as a benchmark for pregnancy termination because they may reflect comparable ischemic vascular modifications in the placenta.

Grade 1 hypertensive retinopathy was the most common with fundus changes as per our study and is in accordance with other studies also. The prevalence of fundus findings in our study is 48.80% which is comparable to other studies.

The obstetrician can utilise the findings of direct as well as indirect ophthalmoscopy to assess the severity of the disease in PIH instances. Retinal haemorrhages and altered retinal arterioles are generally thought to be indicators of identical alterations in the placenta. Ophthalmoscopic examination of the mother's fundus may provide a clue to similar microcirculation alterations in the placenta and, indirectly, to the welfare of the foetus and the mother. This is because the health of the foetus depends on the placental circulation. Hence fundus examination becomes an essential clinical assessment for predicting a poor outcome for the foetus in PIH patients is the fundus examination.

SUMMARY

SUMMARY

In this cross-sectional study, 84 patients at Santosh Hospital who were diagnosed with HDP were taken into account considering the inclusion and exclusion criteria. After receiving written informed consent, a thorough history is taken, blood pressure is checked, and the anterior section is examined. Indirect ophthalmoscopy, 90D slit lamp biomicroscopy, and direct ophthalmoscopy are used for fundoscopy in every case. Investigations done were renal function testing and regular urine analysis.

Age, parity, level of hypertension, and fundus alterations were all examined in the data. The age range of 20 to 30 years had the highest percentage of patients. Primigravida had a higher prevalence of pregnancy-related hypertension than Multigravida. Serous retinal detachment was also seen in 1 patinet with grade 4 retinopathicchanges and blood pressure more than 160/110 mmHg. 51.20% patients had normal fundus and rest 48.80% had positive fundus findings.

Maximum number of proportion of patients had grade 1 hypertensive changes and primigravidas. This study demonstrates a strong correlation between fundus alterations and blood pressure, hypertension severity, proteinuria, and blood urea.

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ANNEXURE

STUDY PROFORMA

Date:

Place:

I. Patient Information:

Name

Age

Gender

OPD / I.P number

Phone no.

Occupation

Diagnosis

II. Obstetric Information:

LMP

EDD

Gravidity

Parity

Vaccination

III. Chief complaints And History of Present illness:

IV. History of present pregnancy:

V. Ocular history:

Trauma

Previous surgery

Use of topical medication

Others if any specify

VI. Past Obstetric history:

VII. Past Medical history:

Diabetes

Hypertension

Renal disorder

Other significant past history

VIII. Personal History:

Alcohol

Smoking

Other substance abuse

IX. Family History:

X. Drug History

I. General Physical Examination:

Vital Signs At admission

Blood pressure (mm Hg)

Pulse (per min)

Respiratory rate (per min)

Pallor

Icterus

Cyanosis

Clubbing

Lymphedenopathy

Edema

Systemic Examination:

Examination At admission

Cardiovascular system

Respiratory system

Per Abdomen

Central nervous system

II.Ocular examination at admission

Head posture

Ocular posture

Facial symmetry

VISUAL ACUITY	**RIGHT EYE**	**LEFT EYE**
Distant vision		
Pin hole		
Near vision		
Color vision		
Best corrected visual acuity		
Projection of rays		
Lids and adnexa		
Conjunctiva		
Sclera		
Cornea		
Anterior chamber		
Iris		

Pupil

Lens

Pupillary dilatation after instillation of mydriatic

FundoscopyRIGHT EYE LEFT EYE

Extra ocular movements

IOP(mm Hg)

<u>Day / Week Post delivery Day 2</u>

Eye R L

Distant Vision

Pin hole

Near vision

Fundus

III.BLOOD INVESTIGATIONS

Hb%

. CBC

. PCV

. RBS

. S. creatinine

. Blood Urea

. S. uric acid

. 24hrs Urine protein

KEY TO MASTER CHART

P.O.G	Period Of Gestation
S.B.P	Systolic Blood Pressure
D.B.P	Diastolic Blood Pressure
V.A	Visual Acquity
Hb	Haemoglobin
S. Creat.	Serum Creatinine
S. Uric A	Serum Uric Acid
B. Urea	Blood Urea

CONSENT FORM

DEPARTMENT OF OPHTHALMOLOGY

SANTOSH MEDICAL COLLEGE & HOSPITAL GHAZIABAD (U.P.)

PATIENT INFORMATION SHEET

You are being requested to take part in a study entitled -**" THE STUDY OF FUNDUS CHANGES IN HYPERTENSIVE DISORDERS OF PREGNANCY"**

VOLUNTARY PARTICIPATIONS

Your participations in this study are entirely voluntary and you are free to withdraw from this study as and you feel so.

RISK (IF ANY)

Adequate care will be taken if patient faces any adverse effect with the drug being used during study.

FORM

I.....S/o/D/o.....

R/o..... has been explained by **DR. NIDHI RAGHAV** about the risk procedure. I volunteer to take part in the study entitled **"THE STUDY OF FUNDUS CHANGES IN HYPERTENSIVE DISORDERS OF PREGNANCY "**and have also been explained the purpose of the study to my satisfaction.

I hereby give my consent to be enrolled in the study.

SIGNATURE:

SANTOSH MEDICAL COLLEGE AND HOSPITAL

INFORMED CONSENT

I.....S/D/W of.....

Resident

of.....

Hereby declare that I give my full and free & voluntary informed consent in the thesis entitled **"THE STUDY OF FUNDUS CHANGES IN HYPERTENSIVE DISORDERS OF PREGNANCY"**

DR. NIDHI RAGHAV has informed to me to my full satisfaction, in the language I understand about the purpose and nature of the study & various physical examinations by the study to be carried out. I have been informed about the duration of the study and instructions to be followed during the study period.

I give full consent for being enrolled in the above study and I reserve my rights to withdraw from the study whenever I wish prejudice of my right to undergo further treatment at Santosh Hospital Ghaziabad U.P.

SIGNATURE OF ATTENDENT:

SIGNATURE OF PATEINT:

NAME:

RELATIONSHIP WITH PATIENT:

Document Information

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INTRODUCTI0N